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User's Manual for the Dynamic (Delaware) Estuary Model

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This report discusses the basic principles and theories underlying the Dynamic Delaware Estuary Model. A description of the water quality interactions modeled in the Delaware are also presented. Being a User's Manual, this report also contains listings of the hydraulic and water quality models, a detailed description of each program and its logical structure, variable definitions, data deck sequences, and sample input/output.

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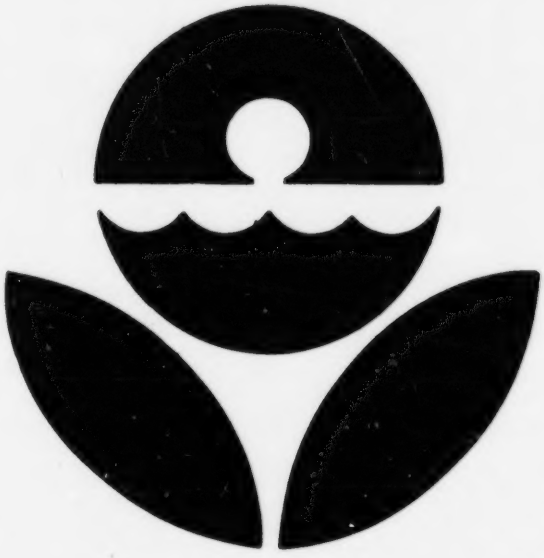

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USER'S MANUAL

FOR THE

DYNAMIC (DELAWARE) ESTUARY MODEL

TECHNICAL REPORT 64

April 1980

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ABSTRACT

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CHAPTER 1

MODEL DESCRIPTION AND THEORY

1.1 INTRODUCTION

Between 1973 and 1978, the Annapolis Field Office (AFO) conducted monitoring surveys and mathematical modeling studies of the Delaware Estuary between Trenton and Liston Point. Technical Report 62, released in January 1978, documented the major modifications to the Dynamic Estuary Model performed by AFO during this period, and the subsequent application of the revised model to the Delaware Estuary [9].

The final tangible results of this work are the calibrated and verified hydraulic and water quality models DYNHYD and DYNDELA. These mathematical computer models are now available for use in further studies of the water quality of the estuary, including forecasts of the water quality response to hypothetical waste-water control strategies. This user's manual provides the details necessary for operating the models.

The Dynamic Estuary Model (DEM) was originally developed during the mid 1960's by Water Resources Engineers, a consultant engineering firm located in Walnut Creek, California, under contract to the Division of Water Supply and Pollution Control, U.S. Public Health Service [1]. The principal individuals associated with the development of this model were Drs. Gerald Orlob and Robert Shubinski. Estuarine modeling was still in its infancy at that point in time, and the DEM was innovative in considering a "real time" computerized tidal solution of the hydrodynamic behavior of estuaries, including the effects of tides. Prior to the development of the DEM, the few estuary models already in existence relied on a net flow or plug flow analysis and attempted to reproduce tidal effects through the inclusion of an artificial

dispersion coefficient. Since these models were non-tidal in nature, the time step for computations was normally equal to the tide period (12.5 hrs.) or, for convenience, one day, and consequently they could not handle short term pertubations in water quality.

The DEM was initially applied to the Sacramento-San Joaquin Delta area in California [1]. Other early applications were to the Suisun, San Pablo and San Francisco Bays [2], [3]. The DEM was first brought to the attention of the Annapolis Field Office (AFO) by Mr. Kenneth Feigner in 1969. Mr. Feigner was the USPHS project officer during the early developmental and application studies in California and was the author of the basic model documentation report [4]. Staff at AFO, with the encouragement and assistance of Mr. Feigner, tested the model rigorously and performed extensive modifications to the reaction kinetics in the quality program during its multi-year application to the Potomac Estuary [5], [6], [7]. The Potomac study was primarily directed towards refining the model's ability to treat nutrient cycles (including uptake by phytoplankton) and towards incorporating algal effects within the DO budget. In addition, the DEM was also applied to the upper Chesapeake Bay during 1972-73 for the development of allowable nutrient loadings from the Susquehanna Basin and the Baltimore Metropolitan Area [8], and most recently to the Delaware Estuary [9].

The Dynamic Estuary Model is actually composed of two separate sub-models plus other convenient calculation routines. Three separate computer programs comprise this version of the DEM: REGAN, DYNHYD, and DYNDELA.

REGAN takes a time series of tidal heights and fits seven harmonic regression coefficients; these are used in the hydraulic program to define the tidal fluctuation at the seaward boundary. DYNHYD, the hydraulic program, takes tributary inflows and seaward tidal fluctuations, and, for specified network geometry, predicts time varying tidal volumes and flows (equivalently, heights and velocities). Because of the constant upstream boundaries and the periodic seaward boundaries, the hydraulics will converge to a unique, constantly recurring (or stationary state) solution. This stationary tidal solution is processed by subroutine HYDEX and stored on tape or disk for later input to the quality program.

DYNDELA, the water quality program, takes the tidal hydraulic solution, and, for specified constituent loads and interactions, predicts time varying constituent concentrations. Because input loads and other forcing functions may vary throughout the simulation, the quality solution does not necessarily reach stationary state. Even at stationary state, a simulation of dissolved oxygen with significant algal influences will exhibit a complex solution with a periodicity of 24 days (due to the 24 hour diurnal cycle interacting with an idealized 12.5 hour tidal cycle).

The numerical solution of the hydraulic and mass balance equations is accomplished on the same network, which represents the geometrical configuration of the estuary. The following sections will discuss in detail the network and the equations used in the hydraulic and quality models.

1.2 THE MODEL NETWORK

1.2.1 OVERVIEW

The DEM represents the prototype by using a network consisting of numerous interconnected "channels" and "junctions". This channel-junction (often called "link-node") network is extremely flexible in that it allows the prototype to be segmented in a manner which considers the complex flow patterns in the lateral plane as well as the effects of an irregular shoreline. A channel element (link) connects two junction elements (nodes) and serves as the transport mechanism between the junction at each end. A junction is a volumetric unit which acts as a receptacle for the fluid (and associated mass) transported through its connecting channels. A channel can connect only two junctions, but a junction can have several channels entering it. The concentration of the water quality parameters; their addition, depletion, decay, and biological/chemical transformations are defined within junctions. Parameters influencing the actual motion of water are assigned and treated in the context of channels.

The model network can be viewed as the overlapping of two closely related subnetworks: (1) the channel network, and (2) the junction network. Figures 1.1a and 1.1b illustrate the configuration of channels and junctions, respectively, for a hypothetical estuary. Since a channel must have a junction at each end, the location, shape, and size of the junctions are dependent on the channel configuration. Figure 1.1c illustrates how the channel and junction networks overlap to form the final model network. Figure 1.1d illustrates a symbolic notation used to define the model network.

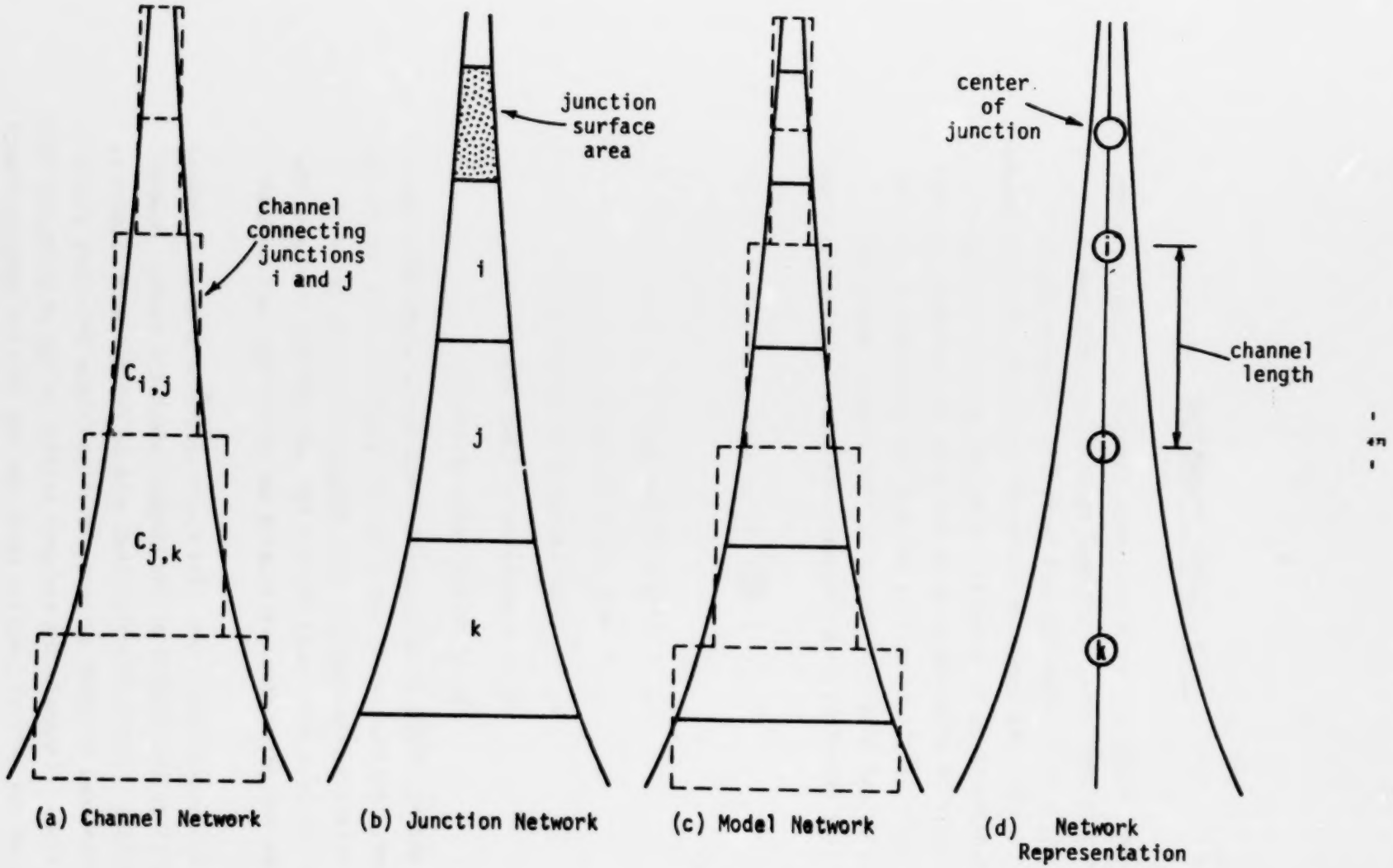


FIGURE 1.1 REPRESENTATION OF THE MODEL NETWORK

1.2.2 CHANNEL PARAMETERS

The parameters associated with channels are length, width, cross-sectional area, frictional resistance coefficient (Manning's "n"), velocity, and hydraulic radius or depth.

Length: The length of a channel equals the distance between the two junctions it connects. Channels must be rectangular and should be oriented so as to minimize the variation of depth over their length as well as reflect the location and position of the actual protytype channels. The channel length is generally dependent on a computational stability criteria given by

$$l_i \geq (\sqrt{gy_i} \pm u_i) \Delta t$$

where:

l_i = length of channel i

y_i = mean depth of channel i

u_i = tidal velocity in channel i

Δt = computational time step

g = acceleration of gravity

Width: There is no apparent limit on the width of a channel. However, if a channel is too wide in relation to its length, the mean velocity predicted may mask important velocity patterns occurring on a more local scale. For well defined channels, the network channel widths are equated to the average bank to bank width.

Cross-sectional area: The cross-sectional area of a channel is equal to the product of the channel width and depth. However, depth is a channel parameter that must be defined with respect to junction head or water surface elevation (since both vary similarly with time). Channels are assigned initial values of width and depth based on the initial junction heads and the initial cross-sectional

areas are computed internally. As the junction heads vary, the channel cross-sectional areas are adjusted accordingly.

Roughness: Channels are assigned "typical" Manning Roughness coefficients. Since the actual value of this coefficient is virtually undefinable, it serves as a "knob" for the calibration of the model.

Velocity: An initial estimate of the mean channel velocity is required for each hydraulic run. Although any value may be assigned, the computational time required for convergence to a steady state solution will depend upon its departure from the true value.

Hydraulic radius: Previous applications of the DEM have employed channels whose widths are greater than ten times the channel depth. Consequently, the hydraulic radius is usually assumed to be equal to the mean channel depth.

1.2.3 JUNCTION PARAMETERS

The parameters associated with junctions are surface area, volume, head, and any accretion or depletion from the system.

Surface area: Except when branching or looping occurs (i.e., when more than two channels enter a junction), the surface area of a junction is equated to one-half of the sum of the surface areas of the two channels entering the junction. When branching or looping does occur, the junction surface areas can be determined by laying out a polygon network using the Thiessen Polygon method, as in Figure 1.2. Since the polygons are normally irregular, a planimeter must be relied upon to obtain surface areas.

Volume: Junction volumes are computed by multiplying the surface area of the junction by the mean depth of the channels (weighted by cross-sectional area) entering the junction.

Head: Junction heads represent the elevation of the water surface above or below an arbitrary horizontal datum. The datum is usually taken to be or referenced to Mean Sea Level.

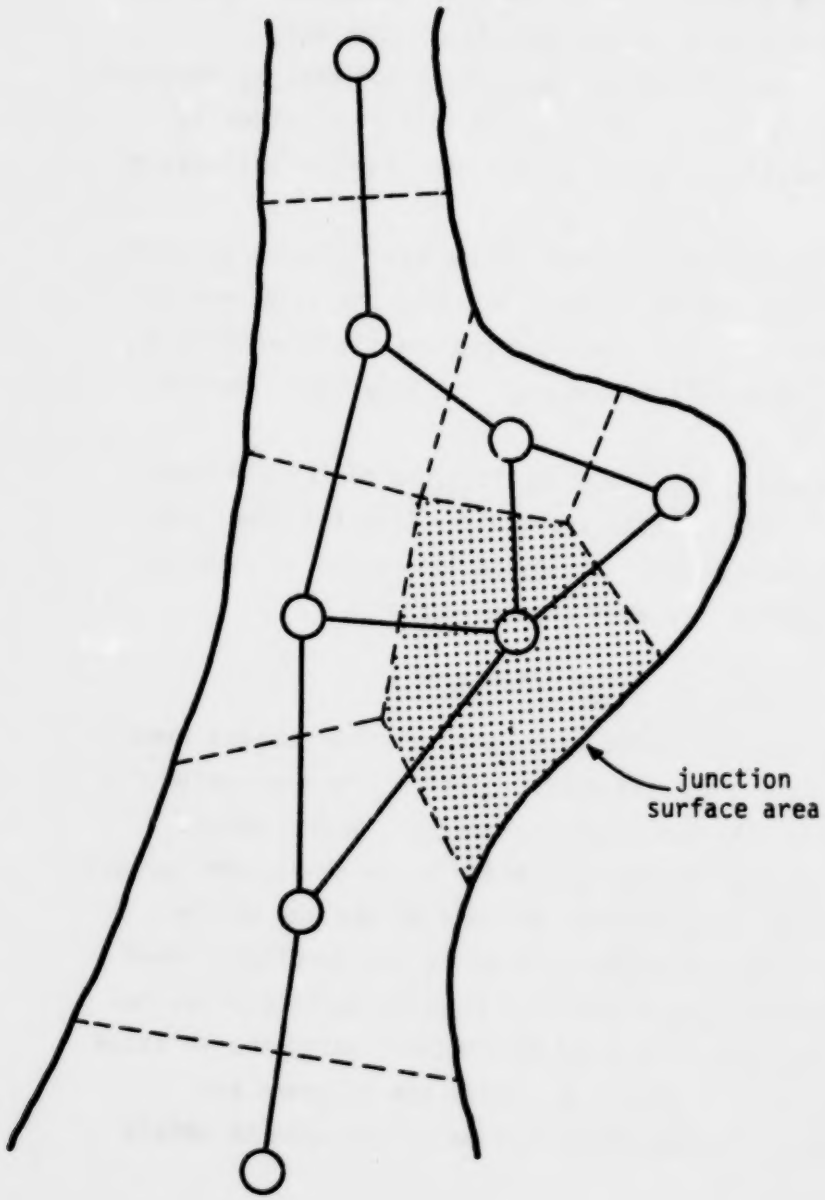


FIGURE 1.2 BRANCHING AND LOOPING IN A NETWORK

Accretion/Depletion: Any accretion to or depletion from the system is handled by the direct addition to or removal from the junction volume or mass.

1.2.4 NETWORK CONFIGURATION AND SIZE

There is a great deal of flexibility allowed in laying out the network of interconnected channels and junctions to represent a particular system. The choice of the boundary locations should include considerations of both hydraulic and quality factors. To minimize difficulties with boundary conditions, the network should, ideally, extend to the ocean at the downstream boundary and to or beyond the limits of tidal effects on inflowing streams, so that the inflow can be considered steady. Such a network eliminates problems associated with dynamic boundary conditions, such as changing salinity, or other quality conditions which could be present if an inland point is chosen for the seaward boundary. Other considerations which could influence the location of the network boundaries and the scale of network elements include the location of specific points where quality predictions are required, the location of existing or planned sampling stations and the availability of data for verification, the degree of network detail desired, and the computer time desired for solution.

For computational procedures, it is necessary that the junctions of the network be numbered consecutively beginning with one. The assignment of numbers to the network can be based on any arbitrary consideration. However, junction number one must be located at the seaward boundary. A separate but similar numbering system for channels is also necessary. Each junction may have from one to five channels entering it. A channel must have a junction at one end; thus, dead-end sloughs must end with a junction. Associated with each junction number are from one to five channel numbers, and associated with each channel number are two junction numbers.

1.3 THE HYDRAULIC MODEL

1.3.1 THEORY

The primary task of the hydraulic model is to solve the equations describing the propagation of a long wave through a shallow water system, while conserving both momentum and volume. This is accomplished by (1) applying the one-dimensional equation of motion to the network channels to predict velocities and flows and (2) applying the continuity equation to the network junctions to predict fluctuations in the water surface elevation (head) and the corresponding changes in volume. The assumptions upon which this approach is based are:

1) flow is predominantly one-dimensional
2) acceleration normal to the x-axis is negligible
3) coriolis and wind forces are negligible
4) channels are rectangular with uniform cross-sectional area and a slope which can be considered negligible
5) tidal conditions (amplitude and period) at the seaward boundary are known
6) wave length is greater than or equal to twice the channel depth

The Equation of Motion - Conservation of Momentum

The equation of motion is given by

$$\frac{\partial u}{\partial t} = -u \frac{\partial u}{\partial x} - k|u|u - g \frac{\partial H}{\partial x} \qquad (1.1a)$$

where:

u = velocity along the x-axis
t = time
x = distance along the x-axis
k = frictional resistance coefficient
g = acceleration of gravity
H = head (height of the wave above an arbitrary datum)

The terms in equation (1.1a) represent the following:

$\frac{\partial u}{\partial t}$ = the time rate of change of velocity; also defined as the local inertia term

$u \frac{\partial u}{\partial x}$ = Bernoulli acceleration (the rate of momentum change by mass transfer); also defined as the convective inertia term as derived from Newton's 2nd Law

$k|u|u$ = frictional resistance (the absolute value sign insures that resistance opposes the direction of flow)

$g \frac{\partial H}{\partial x}$ = gravitational acceleration

The relationship between frictional resistance and the energy gradient is given by

$$k|u|u = g \frac{dH}{dx} \qquad (1.1b)$$

where

$\frac{dH}{dx}$ = energy gradient

For a tidally influenced estuary, few, if any, of the channels experience steady flow. However, over short time intervals, the flow can be considered as steady uniform flow. Consequently, the Manning equation, given by

$$u = \frac{1.485\ R^{2/3}\ s^{1/2}}{n} \qquad (1.1c)$$

or

$$s = \frac{n^2\ u^2}{2.208\ R^{4/3}} \qquad (1.1d)$$

where

R = hydraulic radius of the channel

s = dH/dx = energy gradient

n = Manning's n

can be used to evaluate the frictional resistance coefficient in equation (1.1a). Substitution of equation (1.1d) into equation (1.1b) defines "k" as

$$k = \frac{g\ n^2}{2.208\ R^{4/3}} \qquad (1.1e)$$

The Equation of Continuity - Conservation of Mass

The equation of continuity is given by:

$$\frac{\partial H}{\partial t} = - \frac{1}{b} \cdot \frac{\partial Q}{\partial x} \qquad (1.2)$$

where:

H = head

b = mean channel width

Q = flow

The terms in equation (1.2) represent the following:

$\frac{\partial H}{\partial t}$ = time rate of change of water surface elevation

$\frac{1}{b} \cdot \frac{\partial Q}{\partial x}$ = change in storage along the channel length per unit width

As presented, equations (1.1a) and (1.2) apply to channels. To minimize computational requirements, equation (1.2) is applied to junctions so that:

$$\frac{\partial H}{\partial t} = - \frac{\partial Q}{A^*} \qquad (1.3)$$

where:

A* = surface area of the junction

For use in the model, both equations (1.1a) and (1.3) must be changed to their finite difference forms:

$$\frac{U_{i,t} - U_{i,t-1}}{\Delta t} = -U_{i,t-1}\left(\frac{\Delta U_i}{X_i}\right) - K|U_{i,t-1}|U_{i,t-1} - g\left(\frac{\Delta H_i}{X_i}\right) \qquad (1.4)$$

and

$$\frac{H_{j,t} - H_{j,t-1}}{\Delta t} = \frac{-\Sigma Q}{A^*_j} \qquad (1.5)$$

where:

$U_{i,t}$ = velocity in channel i at time t

$U_{i,t-1}$ = velocity in channel i at time t-1

Δt = computational time step

X_i = length of channel i

$\Delta U_i/X_i$ = velocity gradient in channel i

$\Delta H_i/X_i$ = water surface gradient in channel i

$H_{j,t}$ = water surface elevation in junction j at time t

$H_{j,t-1}$ = water surface elevation in junction j at time t-1

A^*_j = surface area of junction j

ΣQ = algebraic summation of flows into (accretions) and out of (depletions) a junction

K = frictional resistance coefficient ($gn^2/2.208R^{4/3}$)

n = Manning's "n"

R = hydraulic radius of a channel

g = acceleration of gravity

The velocity gradient term ($\Delta U_i/X_i$) presents some computational problems because the computed velocity for a channel is assumed to be constant throughout that channel, hence there is no predicted velocity gradient within a given channel. If branching does not occur, a velocity gradient can be computed as the difference of

the velocities in the channels connected to the junctions at each end of channel i. If branching does occur, this approach cannot be used, since there would be several channels connected to the upstream and downstream junctions. Equation (1.6) can be used to solve this problem.

$$\frac{\partial H}{\partial t} = -\frac{1}{b}\frac{\partial Q}{\partial x} = -\frac{1}{b}\frac{\partial (uA)}{\partial x} \qquad (1.6)$$

$$b\frac{\partial H}{\partial t} = -\frac{u\partial A}{\partial x} - A\frac{\partial u}{\partial x}$$

$$\therefore \frac{\partial u}{\partial x} = -\frac{b}{A}\frac{\partial H}{\partial t} - \frac{u}{A}\frac{\partial A}{\partial x}$$

In finite difference form, this becomes

$$\frac{\Delta u_i}{x_i} = -\frac{b_i}{A_i}\frac{\Delta H_i}{\Delta t} - \frac{u_i}{A_i}\frac{\Delta A_i}{x_i} \qquad (1.7)$$

The expression $\Delta H_i/\Delta t$ is computed as the average of the changes in water surface elevation of the junctions at each end of channel i during the time step (Δt). Similarly, the expression $\Delta A_i/X_i$ is obtained by computing the cross-sectional area at each end of channel i based on the water surface elevation of the junctions at each end.

At this point, there is one equation for each channel and each junction. Given the network configuration and geometry, initial values for channel velocities and junction heads, and specified boundary conditions, (e.g. seaward tidal variations) equations (1.4) and (1.7) can be solved using a modified Runge-Kutta procedure. The solution will converge for a given set of boundary conditions to a dynamic equilibrium having velocities, flows, and heads repeated at intervals equal to the specified tidal period.

1.3.2 SOLUTION TECHNIQUE

The solution of the equations of motion and continuity as described proceeds as follows:

1) The mean velocity for each channel is predicted for the middle of the next time interval (i.e., for time $t + \Delta t/2$) using the channel velocities and cross-sectional areas and the junction heads at the beginning of the time interval.

2) The flow in each channel at the middle of the next time interval is computed using the velocity obtained in step (1) and the cross-sectional area at the beginning of the interval.

3) The head at each junction at the middle of the next time interval is computed using the flows derived in step (2).

4) The cross-sectional area of each channel at the middle of the next time interval is computed using the heads computed in step (3).

5) The mean velocity for each channel is predicted for the full time step ($t + \Delta t$) using the velocities, cross-sectional areas, and junction heads computed for the middle of the time step ($t + \Delta t/2$) in steps (1), (3), and (4).

6) The flow in each channel after a full time step is computed using the velocity for the full time step (computed in step 5) and the cross-sectional area computed for the middle of the time step in step (4).

7) The head at each junction after a full time step is computed using the full step flow computed in step (6).

8) The cross-sectional area of each channel after a full time step is computed using the full step heads from step (7).

9) Repeat steps (1) through (8) for the specified number of time intervals.

1.4 THE QUALITY MODEL

Introduction

The task of the quality model is to solve the equations describing the movement, decay, and transformation(s) of a material by performing a mass balance at each junction for each time step. The quality model is referenced to the same network used in the hydraulic model, and uses the hydraulic solution (heads, flows, and velocities for each time step) as input. Since the time step for the quality program is usually much larger than the time step for the hydraulic program, the hydraulic parameters occurring within a quality time step are averaged. These averaged values cover a full tidal cycle and are stored for use by the quality program. Consequently, the quality time step must be a whole multiple of the hydraulic time step and evenly divisible into the tidal period.

Five constituents, either conservative or non-conservative, can be handled simultaneously by the version of the DEM presented in this report. The concentration of a constituent at any point is affected by mass transfers (advection, dispersion, diffusion), decay, biological/chemical transformations, and the import or export of mass.

1.4.1 THEORY

Advection

The amount of mass present within a praticular volumetric unit or node is dependent on three basic processes: (1) the physical transport of mass into and out of the node, (2) natural and man-made inputs or withdrawls, and (3) internal chemical or biological reactions and transformations. The physical transport of mass is primarily a hydrodynamic phenomena whose components are determined from the putput of the hydraulic model, while inputs/withdrawls and reaction kinetics are specified by the user as inputs to the water quality quality program. The major processes affecting the physical transport of mass through the system are advection, diffusion, and dispersion. A discussion of each of these phenomenon and

how they are incorporated into the DEM follows.

Advection is the transport of mass resulting from the movement of water. Mass is transported in the direction of flow with a velocity equal to the velocity of the water. The basic equation describing the transport of mass across a cross section is given by:

$$T_a = U \cdot C \qquad (1.8)$$

where

T_a = rate at which mass is transported by advection through a unit cross-sectional area in a unit time (mass/area/time)

U = velocity of water in the logitudinal direction

C = concentration of mass being advected

Applying equation (1.8) to an infinitesimal volume of water, the one-dimensional equation describing the concentration change within that volume due to advection is obtained:

$$\frac{\partial C}{\partial t} = U_x \cdot \frac{\partial C}{\partial x} \qquad (1.9)$$

where

$\frac{\partial C}{\partial x}$ = concentration gradient along the x- axis

$\frac{\partial C}{\partial t}$ = time rate of change of concentration

U_x = velocity of water along the x-axis

If both sides of the equation (1.9) are multiplied by a volume term, then the resulting mass balance equation will describe the change in mass due to advection within the volumetric unit, as shown by:

$$\frac{\partial C}{\partial t}(A \cdot \Delta x) = \frac{\partial M}{\partial t} = U_x \cdot \frac{\partial C}{\partial x} \cdot (A \bullet \Delta x) \qquad (1.10)$$

where

A = cross-section area of the computational element (assumed constant)

Δx = length of the computational element

$\frac{\partial M}{\partial t}$ = time rate of change of mass within the computational element

Equation (1.10) describes the instantaneous change in the mass within a computational element due to advection. In the DEM, actual mass transport is calculated only for defined channels entering and leaving a junction. Hence, the general finite difference form of equation (1.10) is given by:

$$\frac{\Delta Mi}{\Delta t} = U_i \cdot A_i \cdot C_i^* \qquad (1.11)$$

where

ΔMi = change in mass, i.e., the amount of mass advected out of channel i

i = channel subscript

A_i = cross-sectional area of channel i

U_i = velocity of water in channel i

Δt = computational time step

C_i^* = concentration of mass in advected water in channel i

Equation (1.11) describes the transport of mass through a channel due to advection. However, concentrations are computed for junctions, so an additional calculation must be made. For each junction, the sum of all the mass advected out of the junction is subtracted from the sum of all the mass advected into the junction. Operationally, this is accomplished by computing the amount of mass advected through a channel and then subtracting that mass from the junction in which flow is leaving and adding the same mass to the junction in which flow is entering. A generalized equation for this procedure is given by:

$$\frac{\Delta M}{\Delta t}j = \Sigma(U \cdot A \cdot C^*)in - \Sigma(U \cdot A \cdot C^*)out \qquad (1.12)$$

where

j = junction subscript

Figure (1.3) illustrates how the above equation computes the change in mass within a junction due to advection.

Diffusion and Dispersion

Molecular diffusion is a process in which mass is transferred from regions of high concentration to regions of low concentration. The basic laws governing this phenomena are known as Fick's laws of diffusion. The one-dimensional form of Fick's first law defines the rate of mass transport through a cross section and is given by:

$$T_d = -D_m \cdot \frac{\partial c}{\partial x} \qquad (1.13)$$

where

T_d = rate of mass transport by molecular diffusion through a unit cross section during a unit time (mass/area/time)

$-D_m$ = molecular diffusion coefficient (area/time)

$\partial c/\partial x$ = concentration gradient along the x-axis

Applying equation (1.13) to a infinitesimal volume and solving for the rate of change of concentration due to molecular diffusion yields Fick's second law, given by:

$$\frac{\partial c}{\partial t} = -D_m \frac{\partial^2 c}{\partial x^2} \qquad (1.14)$$

where

$\frac{\partial c}{\partial t}$ = time rate of change of concentration due to molecular diffusion (mass/volume/time)

In a calm body of water, Fick's laws operate as we have described and the equations describing the transport of mass due to advection and molecular diffusion can be combined to give the basic one-dimensional form of the horizontal transport equation, given below as:

$$\frac{\partial c}{\partial t} = -D_m \frac{\partial^2 c}{\partial x^2} + U \frac{\partial c}{\partial x} \pm S \qquad (1.15)$$

where

$U \frac{\partial c}{\partial x}$ = transport due to advection

$-D_m \frac{\partial^2 c}{\partial x^2}$ = transport due to molecular diffusion

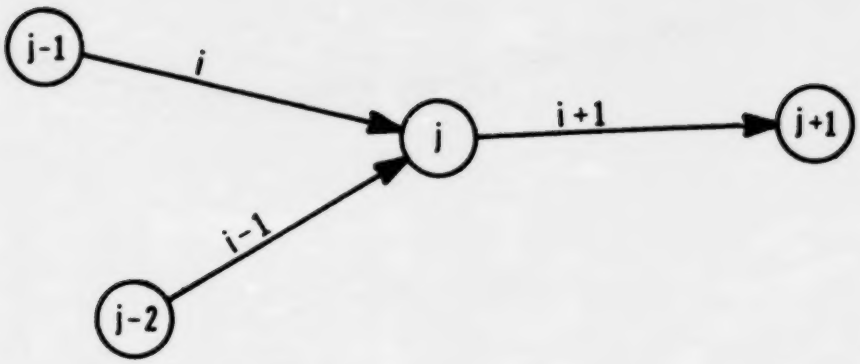
S = any source/sink team for C

$\partial c/\partial t$ = time rate of change of concentration for substance c

However, in turbulent bodies of water, molecular diffusion becomes negligible relative to the processes of turbulent or eddy diffusion and longitudinal dispersion. Turbulent diffusion is the mixing of water by eddy currents due to tidal or some other energy field, such as density gradients. Longitudinal dispersion is a larger scale advection related phenomenon arising from lateral and vertical velocity gradients, whereby mass in the center of the channel is transported at a faster rate than mass at the bottom or sides of the channel (see Figure (1.4)). Since the velocity used in the one-dimensional formulation assumes that the velocity within a channel is constant, this phenomenon is not explicitly accounted for.

If it were feasible to use a "perfect" three-dimensional hydrodynamic model that would compute accurate instantaneous velocities for every point in the estuary, then the processes of turbulent diffusion and longitudinal dispersion would be considered explicitly and there would be no need to consider them any further, i.e., the molecular diffusion coefficient (D_m) would be the only constant to be determined. However, the exact equations of motion are intractable and the modification of these equations by spatial or temporal averaging creates the need for dispersive transport terms. Fortunately, the general form of equation (1.13) can still be used in this situation, and for the one-dimensional approximation, the molecular diffusion coefficient (D_m) can be replaced

$$\frac{\Delta M_j}{\Delta t} = \sum (u \cdot A \cdot c)_{in} - \sum (u \cdot A \cdot c)_{out}$$



$$\frac{\Delta M}{\Delta t}j = u_i A_i c_{j-1} + u_{i-1} A_{i-1} c_{j-2} - u_{i+1} A_{i+1} c_j$$

where ⟶ indicates the direction of flow

u_{i-1}, u_i, u_{i+1} = velocity in channels i-1, i, and i+1

A_{i-1}, A_i, A_{i+1} = cross-sectional area of channels i-1, i, and i+1

c_{j-2}, c_{j-1}, c_j = concentration in junctions j-2, j-1, and j

FIGURE 1.3 MASS TRANSFER BY ADVECTION

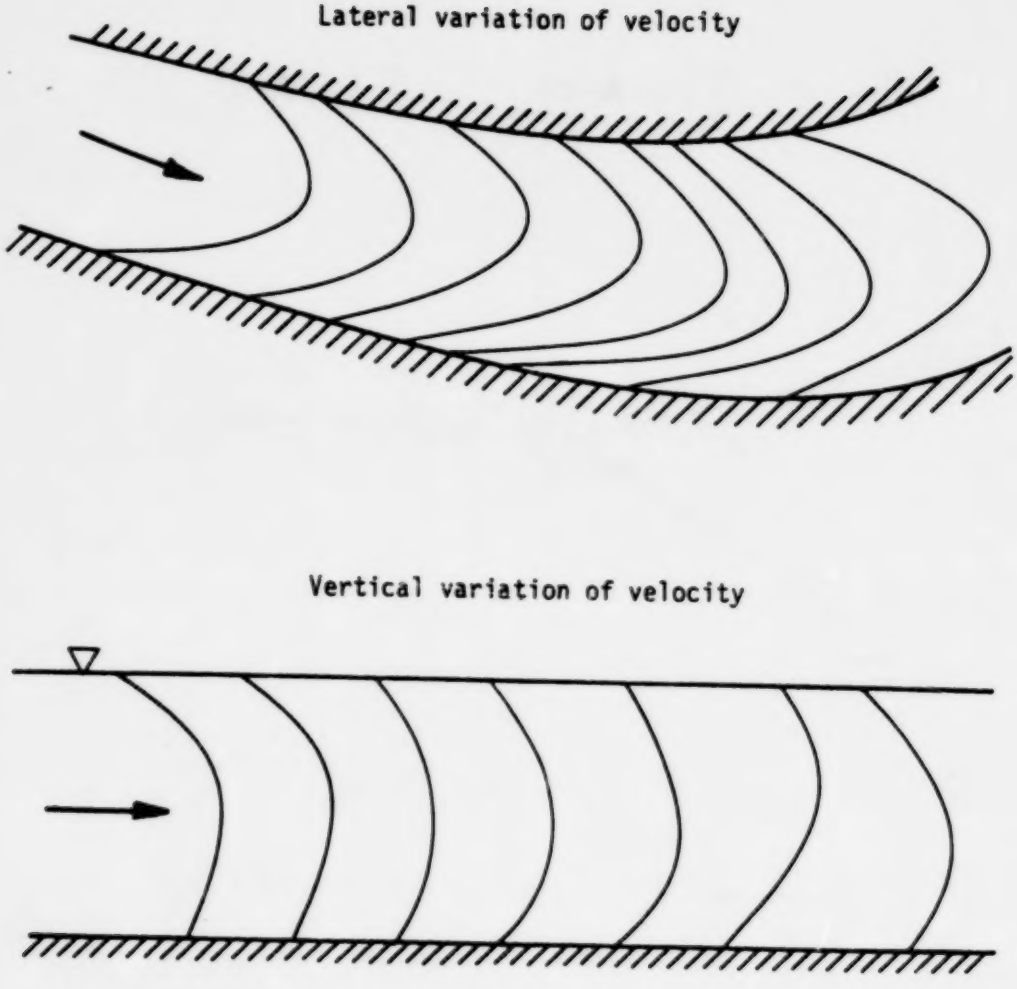


FIGURE 1.4 LATERAL AND VERTICAL VELOCITY PATTERNS

with K_d, an "effective dispersion coefficient". In the one-dimensional case, K_d can be thought of as a coefficient what encompasses the effects of molecular diffusion, turbulent diffusion, longitudinal dispersion, and any other random mixing processes.

To determine the amount of mass transferred through a channel due to "effective dispersion", equation (1.13) need only be multiplied by the cross-sectional area of the channel, which is assumed constant. The concentration gradient for a channel can be approximated by using the difference in the concentration of the junctions at each end of the channel. The finite difference approximation is given by:

$$\frac{\Delta M_i}{\Delta t} = K_d \cdot A_i \cdot \frac{\Delta c_i}{\Delta x_i} \qquad (1.16)$$

where

ΔM_i = the mass transferred through channel i due to "effective dispersion" during a unit time step

K_d = "effective dispersion coefficient" (area/time)

Δx_i = length of channel

Δc_i = concentration difference between the junctions upstream and downstream of channel i

A_i = cross-sectional area of channel i

As was pointed out earlier, concentrations are computed for junctions, not channels. Therefore, a procedure identical to that used for computing mass transport due to advection is also used to compute the transfer of mass due to "effective dispersion".

WRE [11] stresses that the scales of the mixing phenomena themselves may be important in assessing the ability of equations (1.11) and (1.16) to describe the transport of mass throughout the system. The difference between the scales indicates how well certain transport processes can be modeled. If the scale at which the model views the mixing process is close to the scale of pure turbulence, then equations (1.14) and (1.16)

should be fairly reliable representations of the actual transport processes. As the difference between the model and the real world mixing scales increases (e.g. as more spatial and/or temporal averaging or simplifying assumptions are used), the value of K_d will increase accordingly in order to compensate for the loss in resolution.

The magnitude of K_d for estuaries is dependent on the time step used in the simulation and location within the estuary. The time step determines the interval over which quantities that change instantly, the better the resolution of the hydrodynamic and ecological relationships that are simulated. Consequently, a model with a time step of 5 minutes will need a smaller value for K_d than a model that averages hydrodynamics over an entire tidal cycle. The value of K_d is also dependent on the degree of spatial averaging. The greater the difference between the actual velocity at a point and an area-averaged velocity, the larger will be the value of K_d. The value of K_d may also vary spatially throughout the estuary due to changing velocity patterns and density gradients.

Several analytical expressions have been suggested for estimating the value of K_d (see Zison [10] and Feigner [5]). The DEM computes K_d based upon a simplification of the energy dissipation relationship and a spatial approximation of the eddy size.

$$K_d = C_4 / U / R \qquad (1.17)$$

where

U = channel velocity

R = hydraulic radius

C_4 = a dimenationless constant which can be spatially varied

Since the processes of advection and dispersion are independent phenomena, their transport equations can be combined into an equation defining the amount of mass transported through a channel during a time interval Δt. The finite difference form of this equation is:

$$\frac{\Delta M}{\Delta t} = (A \cdot U \cdot C^*) + (K_d \cdot \frac{\Delta c}{\Delta x} \cdot A) \qquad (1.18)$$

where

ΔM = mass transferred through a channel during a unit time step

A = cross-sectional area of the channel

C^* = concentration of advected water

U = velocity of water in the channel

K_d = C4/U/R = "Effective Dispersion Coefficient"

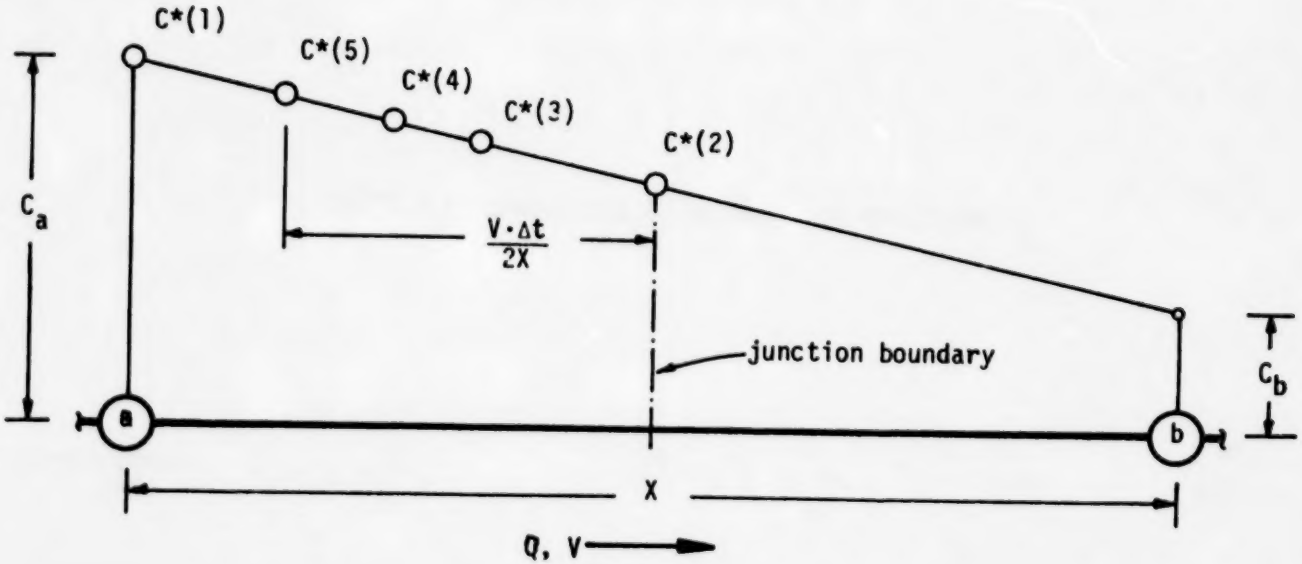
Δx = length of channel

Δc = concentration gradient along a channel, taken as the difference in the concentrations of the junctions at each end of the channel

The solution of equation (1.18) by finite difference methods results in what is commonly called "numerical mixing", "numerical dispersion", or "induced advective dispersion". During every time step, mass is transferred between adjacent junctions through the connecting channel. However, the model assumes that mass is transferred from the center of one junction to the center of the adjacent junction and is then well

mixed. In other words, the model moves mass the entire length of the channel while, in reality, the water only moves a distance equal to $U \cdot \Delta t$. If $U \cdot \Delta t$ is less than the channel length (Δx), then mass is being moved ahead of the water. The greatest difficulties will arise when there are steep concentration gradients between adjacent junctions, whereby the error introduced by advancing constituent mass ahead of the water mass could be numerically large and computational instability could result. Errors are likely to be larger near slack water, where predicted water velocities are a minimum.

While the phenomenon of "numerical dispersion" coincidentally produces an effect which is similar to that of longitudinal dispersion, it is only partially controllable. In order to insure that the discrepancies between observed and predicted concentrations will not become large or accumulate due to numerical mixing problems, certain adjustments must be made. The magnitude of numerical mizing is controlled in the DEM by choosing a value for C* (the advected concentration) that is between the concentrations in the junctions at either end of the channel. Feigner [4] examined several techniques for determining C*. His results are summarized in Figure (1.5) and Table (1.1).



C*(1) = Upstream Concentration = C_a

C*(2) = 1/2 Point Concentration = $(C_a + C_b)/2$

C*(3) = 1/3 Point Concentration = $(2C_a + C_b)/3$

C*(4) = 1/4 Point Concentration = $(3C_a + C_b)/4$

C*(5) = 2-Way Proportional Concentration = $(C_a + C_b)/2 + \frac{V \cdot \Delta t}{2X}(C_a - C_b)$

FIGURE 1.5 METHODS OF COMPUTING C*

Method	Definition of C* (See Figure 1.5)	Numerical Mixing	Accuracy	Stability
Upstream	$C^* = C_a$	High	Poor	Excellent
1/2 Point	$C^* = (C_a + C_b)/2$	Low	Good	Very Poor
1/3 Point	$C^* = (C_a + C_b)/3$			
1/4 Point	$C^* = (C_a + C_b)/4$	Moderate	Good	Acceptable
2 - Way Proportional	$C^* = (C_a + C_b)/2 + \frac{V\Delta t}{2x}(C_a - C_b)$	Low	Good	Poor

TABLE 1.1 COMPARISON OF METHODS FOR COMPUTING C*

Decay

The quality model is capable of describing the fate of both conservative (e.g. salinity) and non-conservative (e.g. BOD or DO) constituents. For non-conservative constituents, the mechanism of decay must be considered.

Zero-Order Decay

For zero-order decay, the quantity of constituent decayed is a function of the rate constant for the reaction being considered. Mathematically, a zero-order reaction is given by

$$\frac{dc}{dt} = -K \qquad (1.17)$$

where

dc/dt = rate of change of c with respect to t
c = concentration
t = time
K = rate constant (mass/volume/time)

The negative sign indicates that the process is one of decay rather than growth. Equation (1.17) is easily integrated to yield:

$$C_t = C_o - K\ (t - t_o) \qquad (1.18)$$

where

C_t = concentration at time t
C_o = concentration at time t_o

This expression can be converted to a finite difference form for a time step of Δt.

$$C_o - C_t = \Delta C_j = K \cdot \Delta t \qquad (1.19)$$

where

ΔC_j = change (decrease) in concentration in junction j during a time interval of Δt

The corresponding mass equation is obtained by multiplying both sides of equation (1.19) by volume.

$$V_j \cdot \Delta C_j = \Delta M_j = K \cdot V_j \cdot \Delta t \qquad (1.20)$$

where

V_j = volume of junction j

ΔM_j = change (decrease) in mass in junction j during a time interval of Δt

Example 1 - Algal Respiration and Photosynthesis

If algal respiration is assumed to be a zero-order reaction, i.e. if the rate at which oxygen is consumed by algae is independent of their concentration, then the rate at which oxygen is removed from the system is given by:

$$\frac{\Delta M_R}{\Delta t} = K_R \cdot V \cdot C_{algae}$$

where

ΔM_R = mass of dissolved oxygen consumed by algae during a time interval of Δt

K_R = rate at which algae consume oxygen (mass of O_2/mass of algae/time)

C_{algae} = concentration of algae (mass/volume)

V = volume

Algal photosynthesis is not a process of decay. However, if it is assumed to be a zero-order reaction, i.e. if the rate at which algae produce oxygen is independent of their concentration, then the rate at which oxygen is added to the system is given by:

$$\frac{\Delta M_p}{\Delta t} = K_p \cdot V \cdot C_{algae}$$

where

ΔM_p = mass of dissolved oxygen produced by algae during a time interval Δt

K_p = rate at which algae produce oxygen (mass of O_2/mass of algae/time)

C_{algae} = concentration of algae

V = volume

The mass of oxygen present in the system at time t is given by:

$$M_t = M_{t-1} + \Delta M_p - \Delta M_R$$

where

M_t = mass of oxygen present at time t

M_{t-1} = mass of oxygen present at time t-1

Example 2 - Sediment Oxygen Demand

If the rate at which oxygen is consumed by bottom sediments is considered constant, i.e. independent of the amount of bottom sediment present, then the change in dissolved oxygen mass due to sediment oxygen demands is given by:

$$\frac{\Delta M_{DO}}{\Delta t} = K_{SOD} \cdot A$$

where

ΔM_{DO} = mass of oxygen consumed by bottom sediments during a time interval Δt

K_{SOD} = rate at which bottom sediments consume oxygen (mass O_2/area/time)

A = surface area of bottom

First-Order Decay

For first-order decay, the quantity of constituent decayed is a function of (1) the amount of the constituent present and (2) the rate constant for the reaction being considered. Mathematically, a first-order reaction is given by:

$$\frac{dc}{dt} = -K \cdot C \qquad (1.21)$$

where

dc/dt = rate of change of c with respect to t
K = rate constant (1/time)
C = concentration
t = time

Again, the negative sign indicates that the process is one of decay rather than growth. Equation (1.21) can be easily integrated to yield:

$$C_t = C_o \; e^{-K\,(t-t_o)} \qquad (1.22)$$

where

C_t = concentration at time t

C_o = concentration at time t_o

This expression can be converted to a finite difference form for a time interval of Δt

$$C_{j,t-1} - C_{j,t} = \Delta C_j = C_{j,t-1} \; (1-e^{-K\Delta t}) \cdot \Delta t \qquad (1.23)$$

where

ΔC_j = change (decrease) in concentration in junction j during a time interval of Δt

$C_{j,t-1}$; $C_{j,t}$ = concentration in junction j at time t-1 and t, respectively

Δt = computational time step

The corresponding mass equation is obtained by multiplying both sides of equation (1.23) by volume

$$V_j \cdot \Delta C_j = \Delta M_j = V_j \cdot C_{j,t-1} (1-e^{-K\Delta t}) \cdot \Delta t$$

where

V_j = volume of junction j

ΔM_j = change in mass in junction j during a time interval of Δt

Example 1 - Biochemical Oxygen Demand (BOD)

The rate at which organic wastes are biochemically oxidized or stabilized is directly proportional to the amount of unstabilized material present. The change in the amount of unstabilized material present (BOD) is given by:

$$\frac{\Delta M_{BOD}}{\Delta t} = V \cdot C_{BOD,\ t-1} \cdot (1-e^{-K_\beta \Delta t})$$

where

ΔM_{BOD} = amount of BOD stabilized during a time interval of Δt

V = volume

Δt = time interval

$C_{BOD,t-1}$ = concentration of BOD at time t-1

K_β = rate at which organic material is stabilized

The amount of BOD present at time t is given by:

$$M_{BOD,t} = M_{BOD,\ t-1} - \Delta M_{BOD}$$

where

$M_{BOD,t-1}$, $M_{BOD,t}$ = mass of BOD present at time t-1 and t, respectively

Example 2 - Reaeration

The oxygen in water is naturally replenished through the process of reaeration (mass transfer at the surface). This process is defined by:

$$\frac{dD}{dt} = -K_d \cdot D$$

where

D = dissolved oxygen deficit, i.e. the saturation concentration minus the actual concentration

K_d = reaeration rate (1/time)

Reaeration is a process in which the dissolved oxygen deficit is reduced (or, conversely, in which the dissolved oxygen concentration is increased). The change in mass of the DO deficit due to reaeration is given by:

$$\frac{\Delta M}{\Delta t} = V \cdot D_{t-1} \cdot (1-e^{-K_d \Delta t})$$

where

ΔM = decrease in the mass of dissolved oxygen deficit (or, the increase in DO mass during a time interval of Δt)

V = volume

D_{t-1} = DO deficit at time t-1

Second-Order Decay

For second-order decay, the quantity of constituent decayed is a function of (1) the amount of constituent present and (2) the rate constant of the reaction. Mathematically, a second-order reaction is given by:

$$\frac{dc}{dt} = -Kc^2 \qquad (1.24)$$

where

dc/dt = rate of change of c with respect to t

K = rate constant (volume/mass/time)

c = concentration

Again, the negative sign indicates that the process is one of decay. Equation (1.24) can be integrated to yield

$$C_t = \frac{1}{k(t-t_o) + \frac{1}{C_o}} = \frac{1}{C_o k(t-t_o) + 1} \qquad (1.25)$$

This can be converted to a finite difference form for a time interval of Δt:

$$\Delta C_j = C_{j,t-1} - C_{j,t} = C_{j,t-1}\left[1 - \frac{1}{(C_{j,t} \cdot k\Delta t)+1}\right]\Delta t \qquad (1.26)$$

where

ΔC_j = change (decrease) in concentration in junction j during the time interval Δt

$C_{j,t-1}$, $C_{j,t}$ = concentration in junction j a times t-1 and t, respectively

Δt = computational time step

The corresponding mass equation is obtained by multiplying equation (1.26) by the junction volume:

$$\Delta M_j = V_j \cdot \Delta C_j \qquad (1.27)$$

where

ΔM_j = change in mass in junction j during a time interval of Δt

V_j = volume of junction j

Example 1 - Sedimentation/Deposition

Many substances are removed from the water system through the process of sedimentation (i.e. settling). Quite often, the rate at which material is removed by this process can be described by first or second order reactions. If the process is a second order one, then the change in mass of a constituent is given by

$$\frac{\Delta M_s}{\Delta t} = V \cdot C_{t-1} \left(1 - \frac{1}{(C_{t-1} \cdot k_s \cdot \Delta t) + 1} \right)$$

where

ΔM_s = amount of mass removed by settling during the time interval Δt

Δt = time step

V = volume

C_{t-1} = concentration at time t-1

k_s = rate at which the material settles

If sedimentation were the only process affecting the material, then the mass present at time t would be given by

$$M_t = M_{t-1} - \Delta M_s$$

where

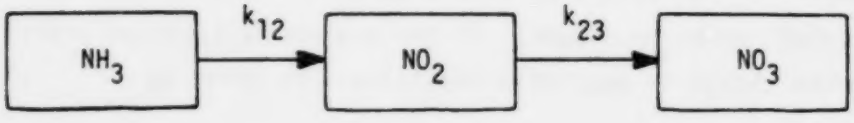
M_{t-1}, M_t = mass of constituent present at times t-1 and t, respectively

Biological / Chemical Transformations

Materials in the aquatic ecosystem often undergo some type of transformation(s). In many cases, these consecutive reactions can be described by the kinetics discussed earlier.

Example 1 - Nitrification

Nitrification is the process by which ammonia (NH_3) is converted to nitrite (NO2) and nitrate (NO_3), as shown in the figure below.



Assuming first order kinetics, the change in mass of each constituent during a time interval of Δt is given by

$$\frac{\Delta M_{NH3}}{\Delta t} = V \cdot C_{NH3,t-1} \cdot (1 - e^{-k_{12}\Delta t})$$

$$\frac{\Delta M_{NO2}}{\Delta t} = \frac{\Delta M_{NH3}}{\Delta t} - V \cdot C_{NO2,t-1} \cdot (1 - e^{-k_{23}\Delta t})$$

$$\frac{\Delta M_{NO3}}{\Delta t} = V \cdot C_{NO2,t-1} \cdot (1 - e^{-k_{23}\Delta t})$$

where

ΔM_{NH3} = the amount of NH_3 converted to NO_2 during Δt

ΔM_{NO2} = the change in mass of NO_2 during Δt

ΔM_{NO3} = the amount of NO_2 converted to NO_3 during Δt

$C_{NH3,t-1}$ = the concentration of NH_3 at time t-1

$C_{NO2,t-1}$ = the concentration of NO_2 at time t-1

$C_{NO3,t-1}$ = the concentration of NO_3 at time t-1

k_{12} = the rate at which NH_3 is converted to NO_2

k_{23} = the rate at which NO_2 is converted to NO_3

The mass of each constituent at time t is given by

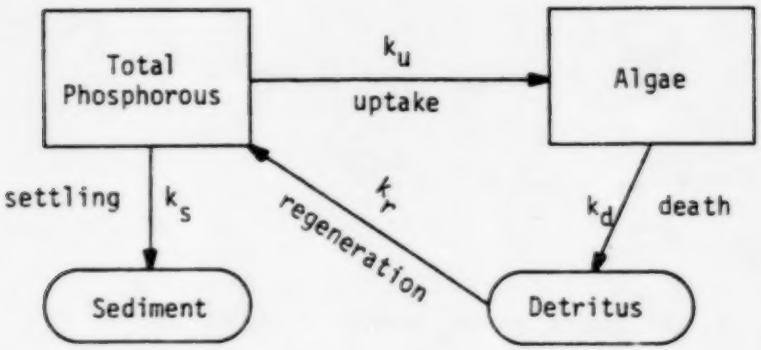
$$M_{NH3,t} = M_{NH3,t-1} - \Delta M_{NH3}$$

$$M_{NO2,t} = M_{NO2,t-1} + \Delta M_{NH3} - \Delta M_{NO3}$$

$$M_{NO3,t} = M_{NO3,t-1} + \Delta M_{NO3}$$

Example 2 - The Phosphorus Cycle

A simplified representation of the phosphorus cycle is shown in the figure below.



Assume that (1) the uptake of phosphorous by algae, the death of algae, and the regeneration of phosphorous from detritus are all first order reactions

(2) the settling of phosphorous is a second order reaction

The change in mass of phosphorous and algae during Δt is given by

$$\frac{\Delta M_p}{\Delta t} = \text{regeneration} - \text{uptake} - \text{settling}$$

$$= M_{pd} \cdot (1 - e^{-k_r \Delta t}) - C_{p,t-1} \cdot V \cdot (1 - e^{-k_u \Delta t})$$

$$- V \cdot C_{p,t-1} \left\{ 1 - \frac{1}{(C_{p,t-1} \cdot k_d \cdot \Delta t) + 1} \right\}$$

$$\frac{\Delta M_a}{\Delta t} = \text{growth} - \text{death}$$

$$= C_{p,t-1} \cdot V \cdot (1 - e^{-k_u \Delta t}) - C_{A,t-1} \cdot V \cdot (1 - e^{-k_s \Delta t})$$

where ΔM_A = change in algae mass during Δt

ΔM_p = change in phosphorous mass during Δt

M_{pd} = mass of phosphorous present in the detritus

$C_{p,t-1}$ = concentration of phosphorous at time t-1

V = volume

$C_{A,t-1}$ = concentration of algae at time t-1

The mass of phosphorous and algae present at time t is given by

$$M_{p,t} = M_{p,t-1} + \Delta M_p = M_{p,t-1} + \Delta M_r - \Delta M_u - \Delta M_s$$

$$M_{A,t} = M_{A,t-1} + \Delta M_A = M_{A,t-1} + \Delta M_u - \Delta M_d$$

where

$M_{p,t-1}$, $M_{p,t}$ = mass of phosphorous present at times t-1 and t, respectively

$M_{A,t-1}$, $M_{A,t}$ = mass of algae present at times t-1 and t, respectively

ΔM_r = mass of phosphorous regenerated from the detritus during Δt

ΔM_u = mass of phosphorous taken up by algae for growth during Δt

ΔM_s = mass of phosphorous removed from the system through settling during Δt

ΔM_d = mass of algae decayed into detritus during Δt

Import / Export

Another process which will affect the mass of a constituent in a junction is the import (e.g. tributary inflow or waste discharge) and/or export (e.g. water supply withdrawal or industrial use) of water from the system. The mass of constituent added (or subtracted) at a junction during each time interval Δt is given by

$$\frac{\Delta M_j}{\Delta t} = \Sigma Q_{in} \cdot C_{in} - \Sigma Q_{out} \cdot C_j \qquad (1.28)$$

where

ΔM_j = the change in mass in junction j during Δt

Q_{in} = flow into junction j

C_{in} = concentration of the constituent in the inflow

Q_{out} = withdrawal from junction j

C_j = concentration of constituent in junction j

1.4.2 SOLUTION TECHNIQUE

Conservation of mass is maintained within the network junctions by combining the equations describing the following processes:

- advection
- diffusion
- decay
- biological/chemical transformations
- import/export

The solution of the quality program is a relatively straightforward and sequential process involving an explicit finite difference technique. The algorithm is as follows.

1) Initial junction volumes and concentrations are specified in order to determine the total mass of each constituent initially present in each junction.

2) Waste load data (e.g.imports and exports) is specified for each junction.

3) Hydraulic parameters are read. Values for channel velocities and flows and junction heads for each time step are read from the "hydraulic extract tape" created by the hydraulic program.

4) Advection - mass is transferred between adjacent junctions in the direction of flow. The amount of mass transferred is determined using a representative concentration (C*).

5) Diffusion - mass is transferred between adjacent junctions from the junction with the higher concentration to the junction with the lower concentration. The amount of mass transferred is proportional to the concentration gradient.

Steps 4 and 5 proceed from one channel to another, until every channel and junction has been examined.

6) Any non-conservative constituents are decayed. If D.O. is a constituent, reaeration occurs here.

7) The wastewater loads and/or withdrawals specified in Step 2 are applied to the appropriate junctions.

8) Hydraulic parameters (flows, velocities, and heads) for the next time step are read from the "hydraulic extract tape".

9) A new concentration for each junction is obtained by dividing the total mass of constituent by the new junction volume.

10) Steps 4 through 10 are repeated for every time step.

CHAPTER 2

IMPLEMENTATION OF THE HYDRAULIC MODEL

2.1 REGRESSION ANALYSIS PROGRAM (REGAN)

2.1.1 PROGRAM DESCRIPTION

When applying the hydraulic model, a tidal input characteristic of the conditions under consideration must be imposed at the seaward boundary of the model. For simulation of an historic condition, the tidal wave chosen should be representative of the tidal conditions which existed at that time. Since it is expensive to simulate a transient condition having significantly varying flows or tidal characteristics, the tide and flow for any historic simulations should be relatively steady. The tidal wave at the seaward boundary is described by

$$Y = A_1 + A_2\sin(\omega t) + A_3\sin(2\omega t) + A_4\sin(3\omega t) + A_5\cos(\omega t) + A_6\cos(2\omega t) + A_7\cos(3\omega t) \quad (2.1)$$

where

Y = head (elevation above or below a horizontal datum)

A_i = regression coefficients

ω = tidal period (hours)

The coefficients A_1 through A_7 are obtained through the regression analysis program (REGAN) which requires tidal heights at equally spaced intervals throughout a tidal period as input. Normally, 30 minute intervals will suffice. This input can be obtained from prototype tidal stage recorders (if available) at the boundary. In the absence of

such data, it may be necessary to use the predictions presented in the Tide Tables published by the U.S. Coast and Geodetic Survey.

Figure 2.1 is a simplified flowchart depicting the sequence of steps for REGAN. A brief description of the program logic is as follows:

STEP 1 - READ AND PRINT CONTROL AND INPUT DATA

Alphanumeric data is read which describes the run, the number of observations (*NDATA*), the number of coefficients *(NCOEFF)*, the maximum number of iterations allowed in the computational loop *(MAXIT)*, the maximum residual allowed for termination of calculations *(MAXRES)*, the tidal period *(PERIOD)*, time shift parameter *(TSHIFT)*, phase angle shift parameter *(PSHIFT)*, the time of the ith observation *(T(I))*, and the value of the ith observation *(Y(I))*. Tables displaying the inputs are printed.

STEP 2 - INITIALIZATION

Variables and arrays used in the calculations of the regression coefficients *(A(I)*, J = 1,*NCOEFF)* are initialized.

STEP 3 - SET UP NORMAL EQUATIONS

The coefficients of the normal equations *(SXX(K,J)* and *SXY(J)*, where J = 1,*NCOEFF* and K = 1,*NCOEFF)* are established.

STEP 4 - SOLVE NORMAL EQUATIONS

The equations established in STEP 3 are used to determine estimates of the regression coefficients. If the maximum number of iterations allowed have been completed, the program procedes to STEP 5. If the number of iterations is less than the maximum number allowed and the maximum residual is greater than the desired maximum residual *(MAXRES)*,

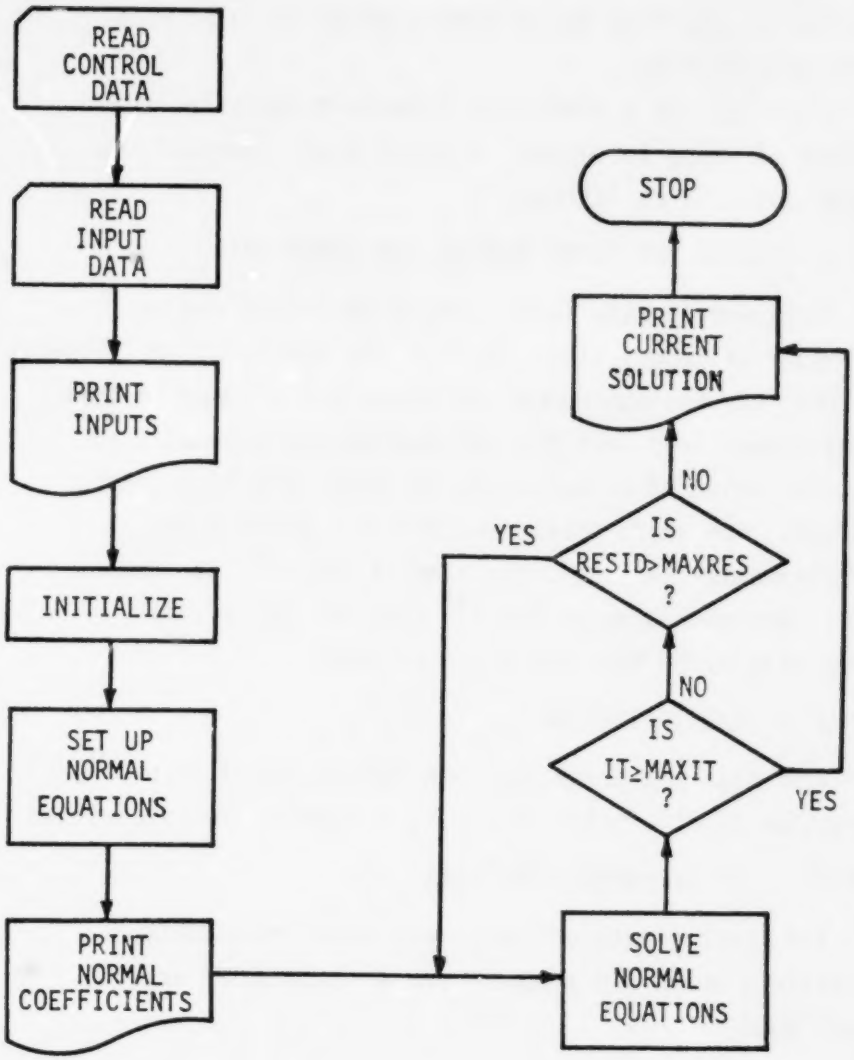


FIGURE 2.1 FLOWCHART OF REGAN

then another iteration is performed to obtain better estimates of the regression coefficients. If the number of iterations is less than the maximum number allowed and the maximum residual is less than or equal to the specified maximum residual, the program proceeds to STEP 5.

STEP 5 - PRINT OBSERVED AND PREDICTED DATA

Tables are printed containing (1) the computed regression coefficients, (2) the observed and predicted data values, and (3) the residual values.

2.1.2 REGAN DATA DECK SEQUENCE

CARD	VARIABLE	COLUMNS	FORMAT	COMMENTS
1	ALPHA(I)	1 - 80	20A4	Read 2 cards
2	NDATA	1 - 10	I10	
	NCOEFF	11 - 20	I10	
	MAXIT	21 - 30	I10	
	MAXRES	31 - 40	F10.0	
	PERIOD	41 - 50	F10.0	
	TSHIFT	51 - 60	F10.0	
	PSHIFT	61 - 70	F10.0	
3	T(1)	1 - 8	F8.0	This card is repeated until all NDATA values of T and Y are read. Each card contains 8 values of T and Y.
	Y(1)	9 - 16	F8.0	
	T(2)	17 - 24	F8.0	
	Y(2)	25 - 82	F8.0	
	.	.	.	
	.	.	.	
	.	.	.	
	T(NDATA)		F8.0	
	Y(NDATA)		F8.0	

2.1.3 REGAN VARIABLE DEFINITIONS

The following section contains definitions for the major variables in REGAN. Variables are listed in alphabetical order. Variables in italics are read from the input data deck.

VARIABLE	SUBROUTINE	DEFINITION	TYPE	UNITS
A(J)		Coefficients obtained by the program which describe the tidal input at a specified junctions. (J = 1, NCOEFF)	R	
ALPHA		Alphanumeric data which describes the run.	R	
MAXIT		Maximum number of iterations desired in the run.	I	
MAXRES		Maximum value of the residual allowed. Will not be exceeded unless the number of iterations reaches MAXIT before the residual reaches MAXRES (a value of .0001 is typically used).	R	
NCOEFF		Number of coefficients in the trigonometric equation.	I	
NDATA		Number of input data points over a tidal cycle.	I	
PERIOD		The period of the tide.	R	hrs.
PSHIFT		Variable which allows the phase angle in the trigonometric relationship to be shifted (usually set equal to zero).	R	
T(I)		Time of the Ith specified data point on thc input tide (I = 1,NDATA)	R	hrs.
TSHIFT		Variable which allows the time scale for the inputs to be shifted (usually set equal to zero).	R	
Y(I)		Elevation of the Ith specified data point on the input data (referenced to model datum).	R	ft.

2.2 THE HYDRAULIC PROGRAM (DYNHYD)

2.2.1 THE "MAIN" PROGRAM

Figure 2.2 is a simplified flowchart depicting the sequence of steps for the Main program of DYNHYD. A brief description of the program logic is as follows:

STEP 1 - READ CONTROL DATA

Alphanumeric data is read which identifies the network size *(NC* and *NJ)*, the length of the run *(NCYC)*, and output control parameters (see Section 2.2.6).

STEP 2 - READ JUNCTION DATA

A separate card is read for each junction. Each card contains the junction number, initial head at that junction, surface area of the junction, the inflow (or outflow) to the junction, and the numbers of the channels entering the junction. After all junction cards are read, a table summarizing the data is printed.

STEP 3 - READ CHANNEL DATA

A separate card is read for each channel. Each card contains the channel number, physical characteristics (length, width, cross-sectional area, hydraulic radius, and Manning's n), initial velocity, and the numbers of the two junctions at the ends of the channel. After all channel cards are read, a table summarizing the data is printed.

STEP 4 - INPUT TIDAL CONDITIONS AT SEAWARD BOUNDARIES

The period of the tide (hours) and the coefficients obtained by REGAN (see Section 2.1) to define the tidal wave at the seaward boundaries are read and printed. The version

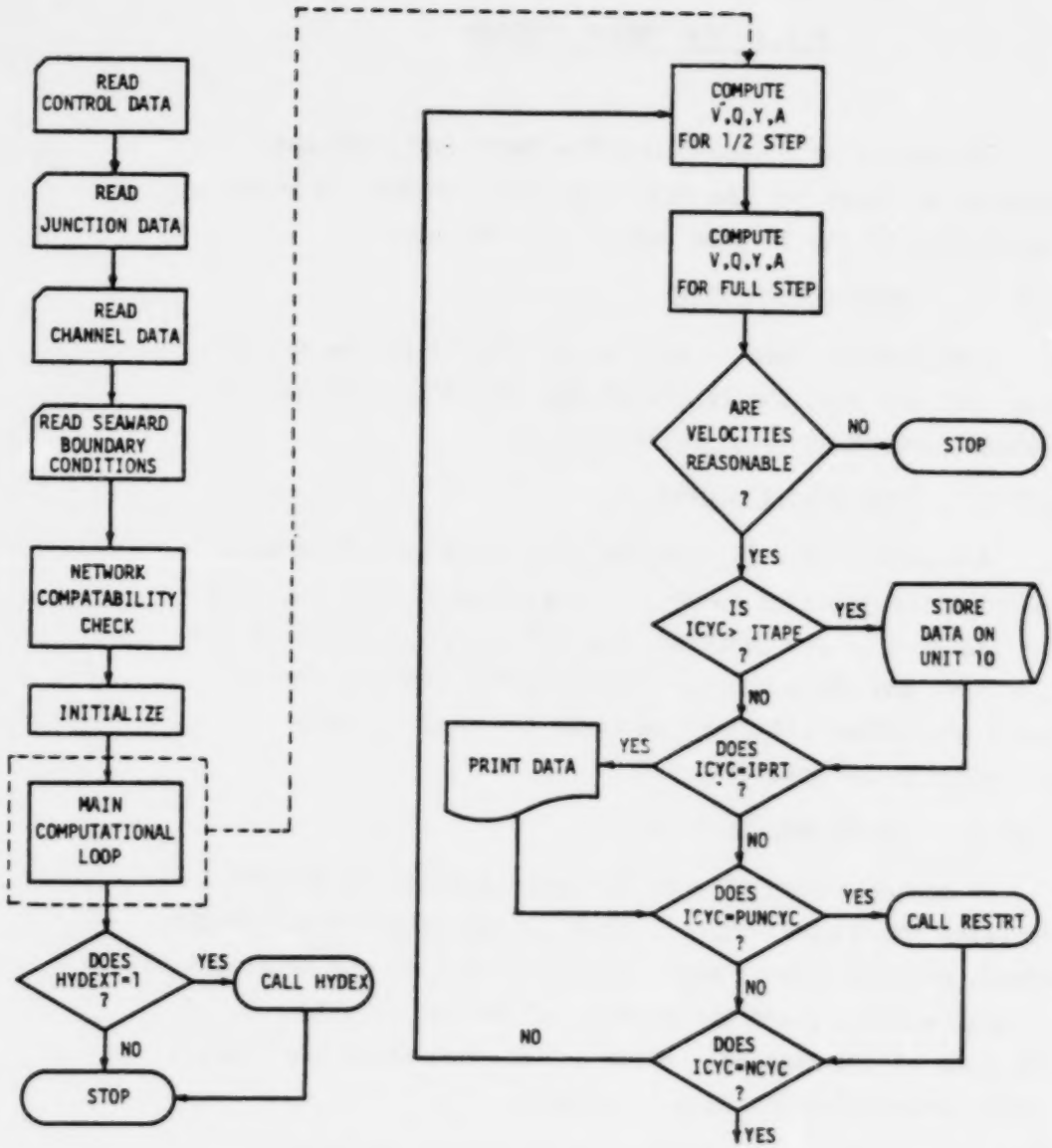


FIGURE 2.2 FLOWCHART OF THE MAIN PROGRAM IN DYNHYD

of the hydraulic model contained herein allows two seaward boundaries. However, the program can easily be altered to accomodate several seaward boundary inputs.

STEP 5 - CHECK COMPATABILITY OF CHANNELS AND JUNCTIONS

A check is made on the compatability of the junction and channel numbering systems. If a junction is listed as being connected to a given channel, then that channel should also be listed as being connected to the junction. Execution will terminate if any discrepencies are found.

The control parameters and the channel and junction data are stored on Unit 10 (temporary magnetic tape or disk).

STEP 6 - INITIALIZATION

Initializes various computation parameters, converts starting time and tidal period from hours to seconds, and computes friction coefficient *(AK(N))* for each channel. Checks the junction numbers at each end of a channel and insures that the junction number associated with *NJUNC(N,1)* is smaller than the junction jumber associated with *NJUNC(N,2)*. This is necessary for the sign convention used to specify the direction of flow in a channel (see Section 2.2.4).

STEP 7 - MAIN COMPUTATIONAL LOOP

If the run is a continuation of a previous run, it is desirable to record the initial conditions (junction heads and channel velocities and flows) on Unit 10. This will be done if variable *IWRTE* = 0. Normally, however, these parameters need not be stored.

The program follows the algorithm described in section Section 1.3.2. Channel velocities,flows, and cross-sectional areas and junction heads are computed for one-half of a time step. These half-step values are then used to compute the full-step values.

The channel velocities are then checked for reasonableness. If a channel velocity exceeds 20 fps, computational instability is indicated and execution is terminated.

The current cycle number *(ICYC)*, junction heads *(Y(J))*, and channel velocities *(V(N))* and flows *(Q(N))* are stored on Unit 10 if the current cycle is greater than or equal to a specified value *(ITAPE)*.

A check is made to determine whether the predictions for the current cycle are to be printed, If so, then the next print cycle is set and printout is obtained for the specified junctions. Printout will always be obtained for the last cycle of the run.

A check is made to determine whether or not Subroutine RESTRT should be called (see Section 2.2.3 for a description of RESTRT). If the current cycle is a specified restart cycle *(PUNCYC)*, then Subroutine RESTRT is called.

STEP 8 - EXIT MAIN LOOP AND CHECK FOR HYDEX

Following the completion of the specified number of computation cycles, a check is made to determine whether or not Subroutine HYDEX is to be called (see Section 2.2.2 for a description of HYDEX). If *HYDEXT* = 1, Subroutine HYDEX is called.

2.2.2 SUBROUTINE HYDEX

As discussed earlier, the quality program time step is usually much longer than a hydraulic time step. The time interval used by the quality program must be a whole multiple *(NODYN)* of the hydraulic time step and evenly divisible into the tidal period. For example, given a tidal period of 12.5 hours, a hydraulic time step of 1.5 minutes, and a quality time step of 30 minutes, *NODYN* would be specified as 20. HYDEX is a subroutine which summarizes (averages) the output stored on Unit 10 for *NODYN* hydraulic cycles and permanently

stores these values on Unit 4 (magnetic tape or disk) for use as input to the quality model.

In addition to summarizing the inter - tidal values of channel velocities and flows and junction heads, HYDEX also determines (1) the minimum and maximum flows, velocities, and cross-sectional areas of channels, (2) minimum and maximum heads of junctions, and the cycles at which they occur, (3) net flow in a channel, (4) average cross-sectional area of a channel, (5) average head of a junction, and (6) range of heads for a junction over an entire tidal cycle.

Figure 2.3 is a simplified flow chart depicting the sequence of steps for Subroutine HYDEX. A brief description of the program logic is as follows:

STEP 1 - READ CONTROL DATA

Reads alphanumeric data identifying the run *(ALPHA(I)*, I = 41,80*)* and the number of hydraulic time steps per quality time step *(NODYN)*.

STEP 2 - READ AND ALIGN INPUT TAPE

The hydraulic summary provided by HYDEX is for a complete tidal cycle. Therefore, it is necessary to determine the hydraulic cycles at which the last full tidal cycle begins *(NSTART)* and ends *(NSTOP)*. This is necessary because, in some cases, the data stored on Unit 10 may exceed a full tidal cycle. Because the hydraulic solution converges to a dynamic steady state solution, the predictions for the last full tidal cycle are used because they are the most representative of the steady state condition. Unit 10 is rewound. The system data stored by the MAIN program is read. Unit 10 is then aligned over cycle *NSTART* and the summary procedure begins.

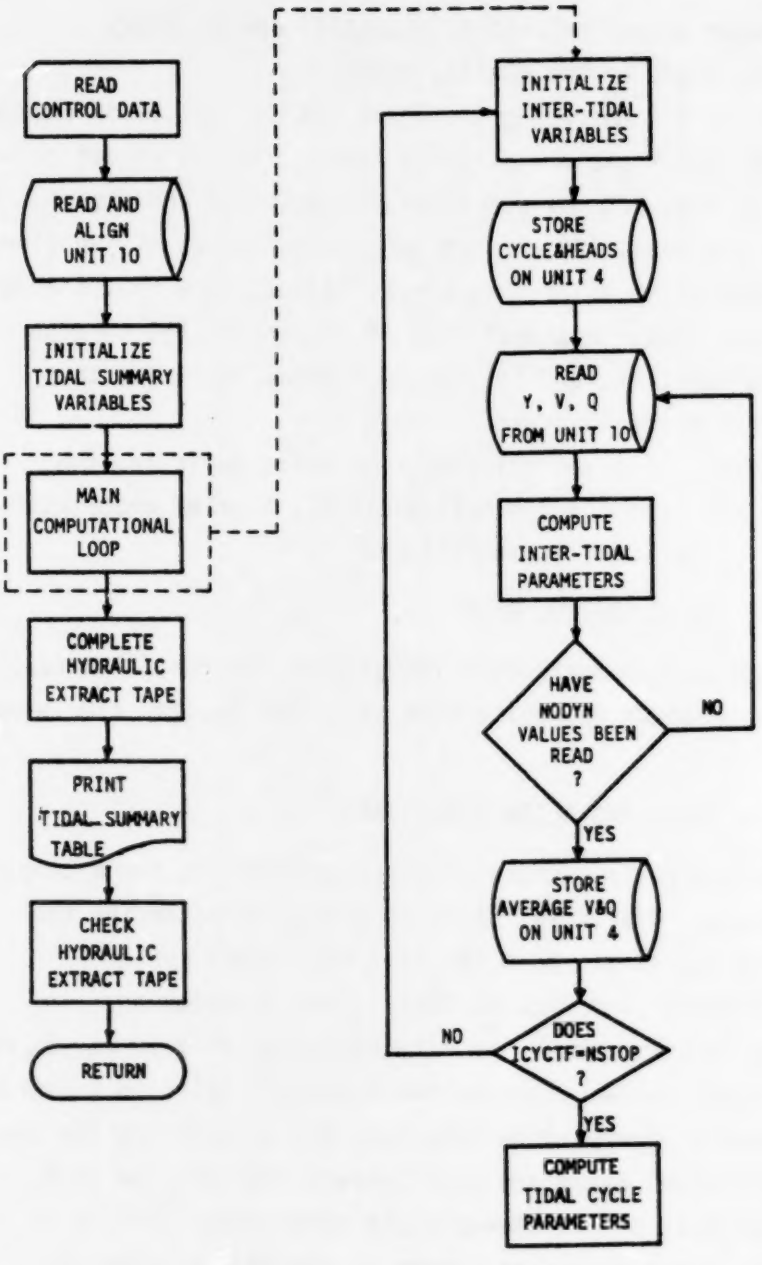


FIGURE 2.3 FLOWCHART OF SUBROUTINE HYDEX

STEP 3 - INITIALIZE SUMMARY VARIABLES

HYDEX computes two types of summary variables. The first group consists of parameters summarized over an entire tidal cycle. These parameters are: net flow in a channel *(QNET(N))*; minimum and maximum velocity *(VMIN(N), VMAX(N))* and flow *(QMIN(N), QMAX(N))* in a channel; minimum, maximum, and average cross-sectional areas of channels *(ARMIN(N), ARMAX(N), ARAVG(N))*, and minimum, maximum, and average junction heads *(YMIN(J), YMAX(J), YAVG(J))*. The second group consists of parameters summarized for discrete intervals within the tidal cycle (i.e. inter-tidal cycle variables). The parameters are the average flow *(QEXT(N))* and velocity *(VEXT(N))* in a channel. These are the values which are obtained by averaging the flows and velocities for *NODYN* hydraulic time steps and are then stored permanently on the "hydraulic extract tape" (Unit 4) for use by the quality program.

The tidal cycle summary variables are initialized only once. However, the inter-tidal cycle variables must be initialized before each inter-tidal summary (i.e. after *NODYN* cycles of data are read and summarized, the values of the inter-tidal summary variables must be re-set). At the start of every inter-tidal summary, the current hydraulic cycle number and the junction heads are stored on Unit 4.

STEP 4 - COMPUTE SUMMARY PARAMETERS

Inter-tidal cycle parameters: The junction heads, channel flows, and channel velocities for *NODYN* hydraulic cycles are read from the record on Unit 10, created by the MAIN program. The heads, flows, and velocities are accumulated, averaged, and stored on Unit 4 (the "hydraulic extract tape"). This process is depicted in Figure 2.4.

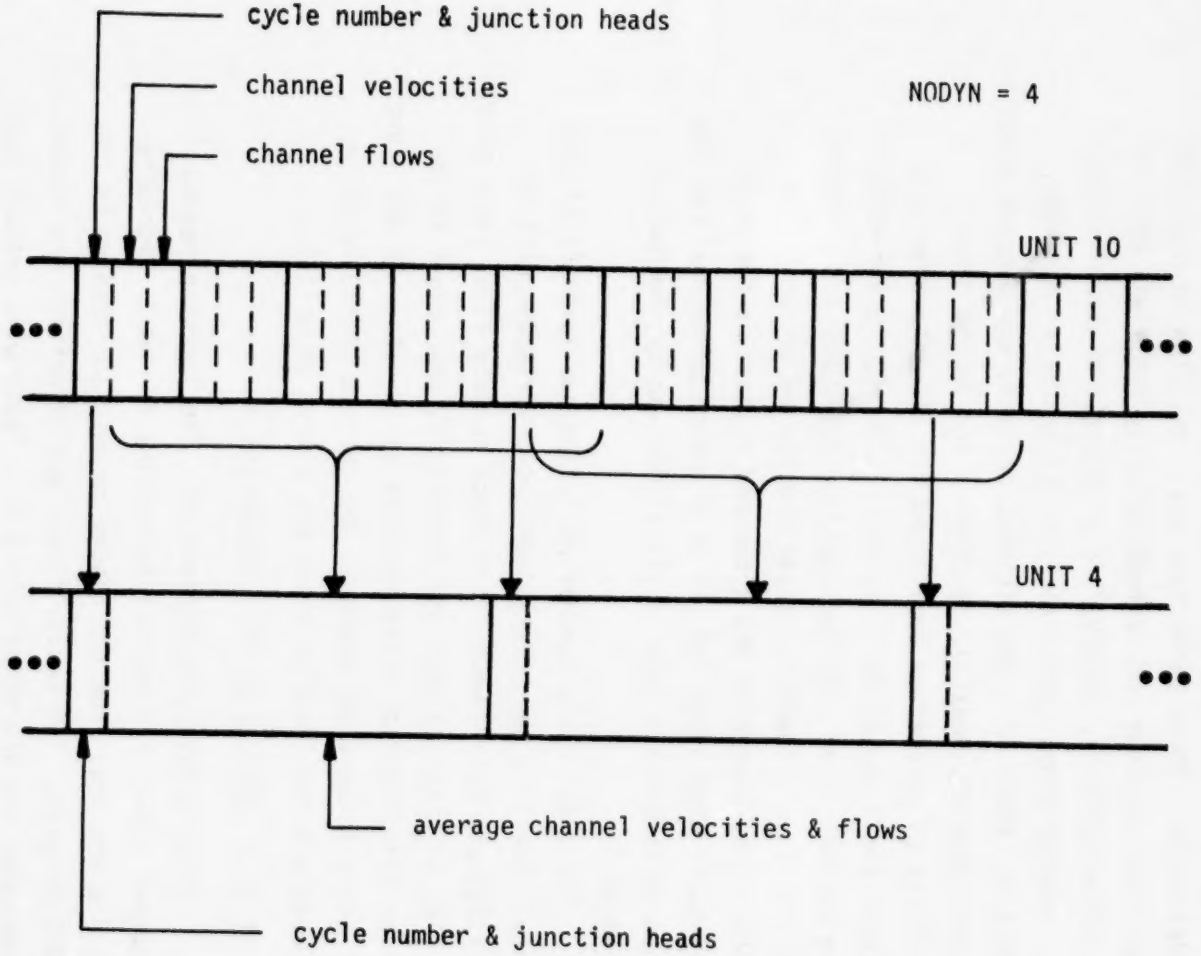


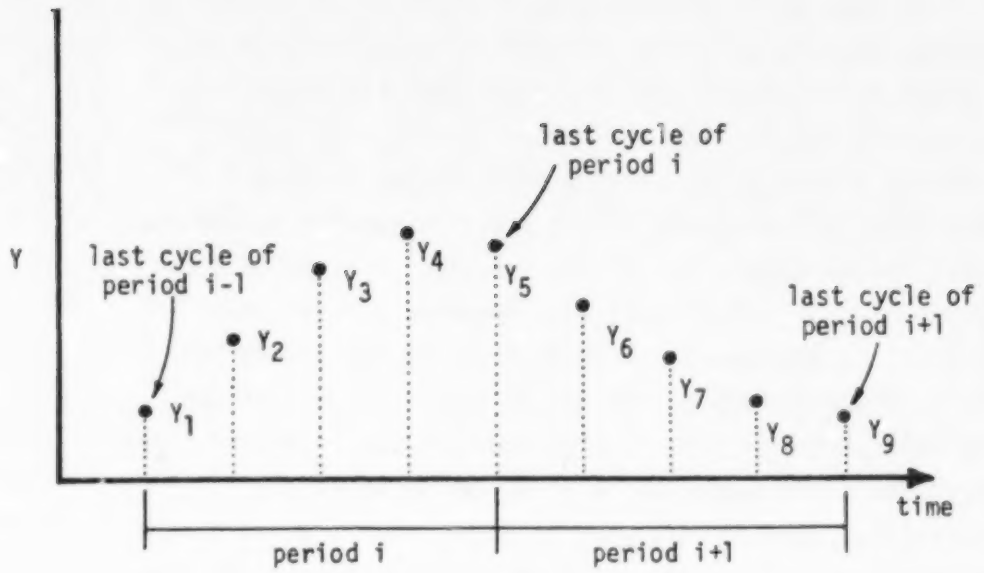
FIGURE 2.4 CREATION OF THE HYDRAULIC EXTRACT TAPE

To compute the average channel flows (*QEXT(N)*) and the average channel velocities *(VEXT(N))* for the inter-tidal summary period (*NODYN* cycles), HYDEX does not simply accumulate *NODYN* values and divide their sum by *NODYN*. Instead, a more refined method of averaging is used. Data from the last cycle of the previous summary period and data from the next *NODYN* cycles are used, i.e. NODYN + 1 cycles of data are accumulated. However, a weight of one-half is assigned to the data from the last cycle of the previous summary period and to the last cycle of the current summary period. The accumulated sum is then divided by *NODYN*. This technique is identical to using the trapezoidal rule to determine the area under a curve over a certain interval *(NODYN)* and then dividing the area by the interval length *(NODYN)* to obtain the average height along that interval. This technique is shown in Figure 2.5.

Tidal cycle parameters: The net flow in a channel over a tidal cycle is computed by averaging the accumulated channel flows. The averaging technique is similar to the method used in STEP 4. The channel cross-sectional area for each cycle are computed and then accumulated over the entire tidal cycle, and averaged. Junction heads are accumulated over the entire tidal cycle and averaged. Checks are made to determine the minimum and maximum values of the following parameters over the entire tidal cycle: channel velocities, channel cross-sectional areas, and junction heads.

STEP 5 - COMPLETE WRITING HYDRAULIC EXTRACT TAPE

After the inter-tidal cycle variables for an entire tidal cycle have been computed and stored on Unit 4, various channel and junction parameters are stored at the end of the hydraulic extract tape.



NODYN = 4

$$\text{Average during period i} = \frac{\frac{1}{2}Y_1 + Y_2 + Y_3 + Y_4 + \frac{1}{2}Y_5}{4}$$

$$\text{Average during period i+1} = \frac{\frac{1}{2}Y_5 + Y_6 + Y_7 + Y_8 + \frac{1}{2}Y_9}{4}$$

$$\text{Average during period N} = \left(\tfrac{1}{2}(Y_\alpha - Y_\beta) + \sum_{i=\alpha+1}^{\beta-1} Y_i\right) \div \text{NODYN}$$

$$\alpha = \text{NSTART} + \text{NODYN}\cdot(\text{N-1})$$

$$\beta = \alpha + \text{NODYN}$$

NSTART = cycle at which summaries begin

FIGURE 2.5 HYDEX AVERAGING TECHNIQUE

STEP 6 - OUTPUT TIDAL CYCLE SUMMARY TABLES

Tables containing both the tidal and inter-tidal summary variables are printed for the model channels and junctions.

STEP 7 - CHECK HYDRAULIC EXTRACT TAPE

Unit 4, the hydraulic extract tape, is rewound and read completely. The hydraulic cycles which were stored on Unit 4 are printed along with the heads at several junctions and the "extract" flows (i.e. the flows computed by HYDEX) in several channels. This provides a check on the data actually stored on Unit 4.

STEP 8 - RETURN TO THE MAIN PROGRAM

2.2.3 SUBROUTINE RESTRT

Subroutine RESTRT has two functions. First, it stores pertinent restart parameters on Unit 4 for use as a restart device in the event of premature termination of execution. Second, it outputs a punched card deck (after the last computational cycle is completed) containing the channel and junction parameters in a format which can be used as an input deck. This type of output is desirable if the run is to be extended. Figure 2.6 is a simplified flowchart describing the sequence of steps for RESTRT.

If the current hydraulic cycle is the last computational cycle, the final channel and junction parameters are punched onto a card deck. A printed summary of this data is also given.

Prior to the final computational cycle, the current channel and junction parameters are stored on Unit 4. The next restart cycle is specified by incrementing the current cycle by *INTPUN* (i.e. *PUNCYC* = *PUNCYC* + *INTPUN*). Unit 4 is rewound so that if computations proceed to the next restart cycle, the data already stored will be updated.

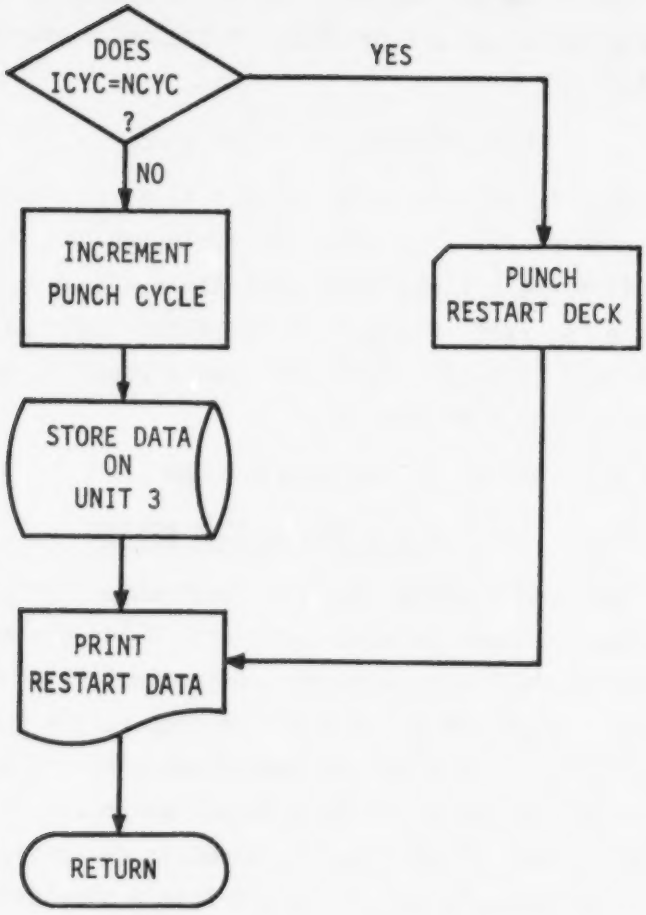


FIGURE 2.6 FLOWCHART OF SUBROUTINE RESTRT

Note that Unit 4 serves a dual purpose in the hydraulic program. If premature termination of execution occurred, subroutine HYDEX (which also uses Unit 4) would not be called and Unit 4 would contain the data needed to restart the run from the last restart cycle. If execution is not terminated prematurely, then the hydraulic conditions existing at the end of the run would be punched onto a card deck before HYDEX was called. The rewind command in HYDEX will ready Unit 4 for storing the hydraulic parameters used by the quality program.

2.2.4 DYNHYD SIGN CONVENTIONS

There are two different sign conventions used in the hydraulic model. The convention used in reference to junctions describes flow into or out of a junction. Specifically, negative values are assigned to any flow entering a junction, while positive values indicate flow leaving a junction (see Figure 2.7). This convention applies regardless of the source of the flow. Inflow from a waste discharge and from and adjacent junction are treated in the same manner.

For channels, signs indicate the direction of flow and velocity. When the flow is from the end of the channel having the lower of the two junction numbers (*NJUNC(N,1)*) toward the end with the higher *(NJUNC(N,2))*, it is assigned a positive value. Flow is considered negative when travelling from the end of the channel with the higher of the two junction numbers toward the end with the lower (see Figure 2.7).

The channel flows are outputted using the junction sign convention so that the user can see if water flows into or out of a particular junction. The channel flow and velocity signs are converted to junction sign convention strictly for convenience in interpreting the output. To interpret

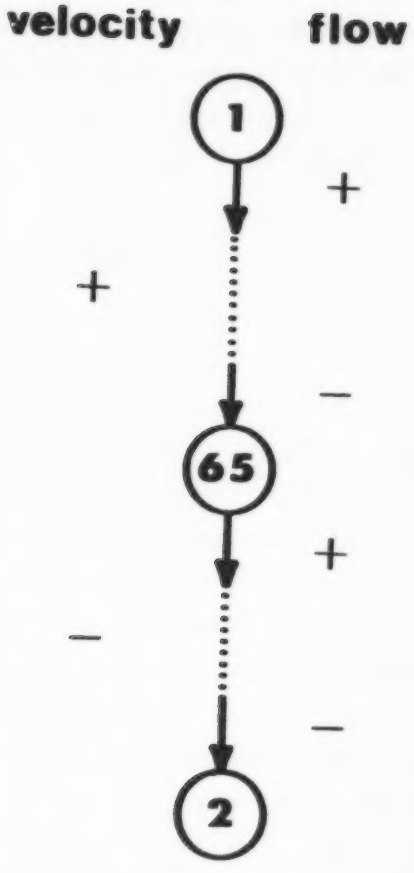


FIGURE 2.7 DYNHYD SIGN CONVENTIONS

the direction of channel flow, it is necessary to know the configuration of channels and junctions, i.e. which junction is at each end of a channel. This information can be found in the Channel Data table at the beginning of the DYNHYD output.

2.2.5 INPUT REQUIREMENTS

The input requirements for the hydraulic program can vary tremendously, depending on the uniqueness of the conditions to be simulated. In any case, the data requirements for the initial application of the model to a system are considerable.

PHYSICAL PARAMETERS OF THE PROTOTYPE

As discussed earlier, the channels and junctions of the model network must be described by certain physical parameters.

Channel Parameters: Length, width, depth, surface area, roughness, cross-sectional area

Junction Parameters: head, volume

For all runs subsequent to the initial run, the input data requirements are greatly reduced. Many of the physical parameters such as channel lengths and widths and the surface area of each junction remain constant during execution and, therefore, do not vary between runs. Similarly the network layout and numbering systems generally remain constant. Only if physical changes in the prototype (real or proposed) are to be modeled is it necessary to change the model network.

MANNING'S ROUGHNESS COEFFICIENT

As mentioned earlier, the roughness coefficient (Manning's n) acts as a "tuning knob" for the hydraulic model. Unfortunately, there is no exact method for defining the value of n, and one must rely on literature values, sound engineering judgement, and personal experience to estimate its value.

The value of n is highly variable and depends on the following factors: surface roughness, vegetation, channel irregularities in cross-section or shape, obstructions, silting and scouring, stage, and discharge [10]. Before attempting to estimate n, Chow [10] recommends that one attempts to (1) understand the factors which affect the value of n so as to narrow the range of guesswork, (2) consult the literature for representative values, and (3) examine and become acquainted with channels whose roughness coefficients are known.

There are some methods which have been suggested for the computation of n. Cowan [11] has proposed an empirical procedure which includes several of the factors that influence n. Two other methods, based on the theoretical velocity distribution in a rough channel, have also been proposed. The first method uses the observed vertical velocity distribution and is described by Boyer [12] and Langbien [13]. The second uses a "roughness function" to determine n and is described by Einstein and Barbarossa [14]. Davidson, et.al. [15] outline a numerical technique which determines the best - distributed values of n based on observed tidal heights.

When calibrating the hydraulic model, changing the value of n in one channel will affect the upstream channels in one way and the downstream channels in another. Increasing n causes more energy to be dissipated in that channel. As a result, the height of the tidal wave will decrease and the time of travel through the channel will increase. Lowering n decreases the resistance to flow, i.e. less energy is dissipated. This results in a higher tidal wave and a shorter time of travel. In general, the value of n will increase as one moves up the estuary since channels become more constricted.

INITIAL CONDITIONS

The most demanding of these inputs are the channel cross-sectional areas and the junction heads. The specified junction heads establish the water surface elevation throughout the network and correspond to those areas. The heads throughout the system are referenced to a common, horizontal datum, such as mean sea level. Channel depths can usually be obtained with sufficient accuracy from the soundings printed on navigation charts published by the Coast and Geodetic Survey. Unfortunately, however, these soundings are normally representative of a mean low water condition at the point of the sounding and are not referenced to a common datum. It is therefore necessary to establish the relationship selected for the model. Such relationships may be available for certain points in the system, such as at tidal stage recorders or at other points where tidal predictions are made. River bed profiles may also be available from which such relationships could be determined. Once the relationships between the junction heads and channel cross-sectional areas have been properly established for a given system, they should never have to be reestablished because the model program maintains the proper relationship at all times during execution. It is usually most expeditious to specify a constant value for each of the junction heads (assumes a horizontal water surface) in preparing the data for the first time and then adjust the channel depths (and cross-sectional areas) accordingly. While it might be desirable, in order to save computation time, to sepcify the initial heads at each junction in such a manner that the water surface profile is more representative of one which actually occurs in the prototype, such an effort is probably not warranted. Unless extensive tide data is available to establish

the water surface elevation at many points in the system for a given instant in time, a great deal of interpolation between points will be required. It is doubtful whether the execution time saved by such a procedure warrants the additional effort involved.

A similar argument holds for the specification of the initial velocity in each channel. Normally, data in sufficient quantity will not be available to establish a detailed velocity pattern for the entire system at a given instant in time. Therefore, a constant initial velocity (such as zero) is assumed throughout the system. Thus, for the initial run on a new system, the total mass of water might initially be assumed to be at rest with a horizontal water surface. As the solution progresses it will converge to the appropriate dynamic steady state condition wherein the head at each junction and the velocity and flow in each channel are repeated with a frequency equal to the period of the specified tide. Normally, four complete tidal cycles will be sufficient to reach a steady state condition. If relatively accurate initial conditions are specified, fewer tidal cycles are needed.

TIDAL CONDITIONS

The tidal conditions at the seaward boundary are described by a set of regression coefficients. These coefficients are derived for any tidal condition by program REGAN (see Section 2.1).

ACCRETIONS / DEPLETIONS

The accretions or depletions at each junction in the system must by specified for each run. Although not programmed for the version of the hydraulic model contained in this report, it would be relatively simple to input accretions/ depletions which vary with time.

CONTROL DATA

Control data is usually unique for each run and may need to be respecified.

2.2.6 OUTPUT OPTIONS

The hydraulic program can provide three types of output: printed output, output stored on magnetic tape or disk, or punched output in the form of a restart deck.

Printed output: Printed output can occur in the MAIN program, Subroutine HYDEX, and Subroutine RESTRT.

In the MAIN program, printed output is controlled by four parameters: *IPRINT*, *INTRVL*, *NOPRT*, and *JPRT(I)*, where I = 1,*NOPRT*. Printout begins at cycle *IPRINT* and will occur every *INTRVL* cycles thereafter for *NOPRT* specified junctions. *JPRT(I)* identifies the numbers of the junctions for which output is printed. The output for a junction consists of the head at that junction and the flow and velocity for each channel entering that junction.

In Subroutine HYDEX, tables summarizing the data used to create the "hydraulic extract tape" (i.e. tables which summarize the last full tidal cycle of data) are printed. The parameters printed are the (1) net flow in each channel, (2) minimum and maximum junction heads and the cycle of their occurence, (3) the average junction head, (4) the range of junction heads, (5) minimum, maximum, and average channel velocities, (6) minimum, maximum, and average channel flows, and (7) minimum, maximum, and average channel cross-sectional areas.

The printout from HYDEX can be very useful when the model is being applied to a new prototype. The net flow in a channel is helpful in determining whether or not a steady-state solution has been reached. When the solution has converged to steady-state, the net flow in a channel should be equal to

the algebraic sum of the flows specified above that channel. The summaries of junction heads and channel velocities are useful when calibrating the hydraulic model because they can be compared to observed tidal elevations and velocities in the prototype.

In Subroutine RESTRT, tables indicating the restart data are printed. These tables contain the junction heads, surface areas, inflows and the channel lengths, widths, depths, cross-sectional areas, roughness coefficient, and velocity existing at the restart cycle *(PUNCYC)*.

Magnetic Tape/Disk Output: Output on Tape or Disk can be obtained in either Subroutine RESTRT or HYDEX.

If execution should terminate prematurely, Subroutine RESTRT will retain a record of the system conditions at the last restart cycle *(PUNCYC)* on Unit 4.

If Subroutine HYDEX is called, a permanent record is made on Unit 4 of the hydraulic parameters needed as input for the quality program (heads, flows, and velocities).

Punched Output: Punched output occurs in Subroutine RESTRT

When Subroutine RESTRT is called, the channel and junction parameters for the final hydraulic cycle can be punched onto a card deck. The format of the deck is such that it can be used as input for a different hydraulic run.

2.2.7 POTENTIAL IMPLEMENTATION DIFFICULTIES

PREMATURE TERMINATION

Before the main computation loop is entered, the hydraulic program checks the compatability of the channel and junction numbering systems. If any discrepancies are found, the program will terminate.

UNSTABLE SOLUTION

Execution of the hydraulic program is terminated if the velocity in any channel exceeds 20 fps, indicating an

unstable (diverging) solution. This problem generally arises most frequently during the initial applications of the model to a new system. It can arise, however, even after many successful previous applications, particularly if the hydraulic conditions are significantly different from any previously considered.

An unstable solution usually results from one or more of the following conditions: (1) one or more inputs have been improperly specified (keypunching error, etc.), (2) the stability criterion is violated for a certain channel (indicating the channel length should be increased or the time step decreased), (3) a junction surface area is not properly represented (occurs frequently at dead end channels), or (4) a junction volume is not properly represented (occurs either at dead end channels or in areas such as tidal flats where the depth at low tide may be zero). Under such conditions, unrealistic hydraulic gradients can be created which result in excessive velocities.

The instability can usually be eliminated at dead end channels by increasing the surface area of the end junction somewhat above that indicated on published maps or charts. This tends to eliminate wave reflection caused by the abrupt channel ending. There may be little, if any, wave reflections in the prototype since a real channel rarely ends as abruptly as represented by the model network.

Similarly, in areas such as tidal flats, where the depth at low tide may reach zero, the instability can normally be corrected by increasing the depths of the peripheral channels slightly. As programmed, the model does not adjust the water surface area of a junction as the water rises and falls. There is also no provision for allowing a junction to "run dry" (reach zero depth). However, the model network parameters in these areas may by specified to

compensate for these shortcomings. The channel depths and the surface area assigned to the junctions are representative of the mean tide level such that the junction volumes are slightly over-represented at low tide and under-represented at high tide.

STORAGE

For systems represented by a network with a large number of junctions and channels, the length of the record to be stored on Unit 10 may exceed the maximum limit for a magnetic tape, i.e., the tape may be completely filled. For such cases it may be necessary to reprogram the hydraulic program and Subroutine HYDEX to accommodate two tapes rather than one. The reprogramming effort is largely tied to the specification of the starting and stopping points on each tape.

2.2.8. DYNHYD DATA DECK SEQUENCE

CARD	VARIABLE	COLUMNS	FORMAT	COMMENTS
1	ALPHA(J)	1-80	20A4	2 cards - Identifies the run.
2	HEADER	1-80	20A4	Indicates that Control Data follows.
3	NJ	1-5	I5	
	NC	6-10	I5	
	NCYC	11-15	I5	
	DELT	16-20	F5.0	
	TZERO	21-25	F5.0	
4	IPRINT	1-5	I5	
	INTRVL	6-10	I5	
	NOPRT	11-15	I5	
5	JPRT(1)	1-5	I5	Repeat until NOPRT values
	JPRT(2)	6-10	I5	are read (read NOPRT/16 of
	.	.	.	these).
	.	.	.	
	.	.	.	
6	ITAPE	1-5	I5	
	HYDEXT	6-10	I5	
7	PUNCYC	1-5	I5	
	INTPUN	6-10	I5	
8	HEADER	1-80	20A4	Indicates that Junction Date follows.

CARD	VARIABLE	COLUMNS	FORMAT	COMMENTS
9	JJ	1-5	I5	Read NJ of these cards.
	Y(J)	6-15	F10.0	
	AREAS(J)	16-25	F10.0	
	QIN(J)	26-35	F10.0	
	NCHAN(J,1)	36-40	I5	
	NCHAN(J,2)	41-45	I5	
	.	.	.	
	.	.	.	
	.	.	.	
	NCHAN(J,5)	56-60	I5	
10	HEADER	1-80	20A4	Indicates that Channel Data follows.
11	NN	1-5	I5	
	CLEN(N)	6-13	F8.0	
	B(N)	14-21	F8.0	
	AREA(N)	22-30	F9.0	
	R(N)	31-37	F7.0	
	(N(N)	38=45	F8.0	
	V(N)	46-53	F8.0	
	NJUNC(N,1)	54-58	I5	
	NJUNC(N,2)	59-63	I5	
12	HEADER	1-80	20A4	Indicates that Seaward Boundary data follows.
13	NK	1-5	I5	

CARD	VARIABLE	COLUMNS	FORMAT	COMMENTS
14A	PERIOD	1-10	I10	
	A1(1)	11-20	F10.0	
	A1(2)	21-30	F10.0	
	.	.	.	
	.	.	.	
	.	.	.	
	A1(NK)	...	F10.0	
14B	PERIOD	1 - 10	I10	Must be the same period as on 14A.
	A2(1)	11 - 20	F10.0	
	A2(2)	21 - 30	F10.0	
	.	.	.	
	.	.	.	
	.	.	.	
	A2(NK)	.	.	
15*	HEADER	1 - 80	20A4	Indicates that HYDEX Data follows.
16*	ALPHA(I)	1 - 80	20A4	2 cards - Identifies run.
17*	NODYN	1 - 5	I5	
				* Cards 15, 16, and 17 are read only if Subroutine HYDEX is called (i.e. HYDEXT = 1).

2.2.9 DYNHYD VARIABLE DEFINITIONS

The following pages contain definitions for the major variables in DYNHYD. Variables are listed in alphabetical order. Variables in italics are read from the input data deck.

VARIABLE	SUBROUTINE	DEFINITION	TYPE	UNITS
A1(I)	MAIN	Coefficients for tidal input (head) at seaward boundary obtained from program REGAN. (I = 1,NK)	R	
AK(N)	MAIN HYDEX	Frictional coefficient for channel N.	R	
AKT	MAIN	Frictional coefficient during full step computation.	R	
AKT2	MAIN	Frictional coefficient during half step computation.	R	
ALPHA(I)	MAIN HYDEX	Alphanumeric identifier printed as part of output. (I = 1,80)	R	
ARAVG(N)	HYDEX	Mean cross sectional area of channel N over full tidal cycle.	R	ft^2
AREA(N)	MAIN HYDEX RESTRT	Cross sectional area of channel N. Corresponds to the head specified at junctions at ends of the channel.	R	ft^2
AREAS(J)	MAIN HYDEX RESTRT	Surface area of junction J	R	ft^2
AREAT(N)	MAIN	Cross sectional area of channel N during a half time step.	R	ft^2
ARMAX(N)	HYDEX	Maximum cross sectional area of channel N over full tidal cycle.	R	ft^2
ARMIN(N)	HYDEX	Minimum cross sectional area of channel N over full tidal cycle.	R	ft^2
B(N)	MAIN HYDEX RESTRT	Width of channel N.	R	ft

VARIABLE	SUBROUTINE	DEFINITION	TYPE	UNITS
CLEN(N)	MAIN HYDEX RESTRT	Length of channel N.	R	ft
CN(N)	MAIN HYDEX RESTRT	Manning roughness coefficient for channel N.	R	
DELT	MAIN HYDEX	Time interval used in solution.	R	secs
DELTQ	HYDEX	Time step for the quality program (DELTQ = DELT * NODYN).	R	secs
DELT2	MAIN	One half time step. (Equals DELT/2)	R	secs
DVDX	MAIN	Defines velocity gradient ($\Delta U/\Delta X$) in a channel.	R	
FLOW	MAIN	Discharge. Follows sign convention used for hydraulic printout.	R	cfs
G	MAIN	Acceleration due to gravity (32.1739 ft/sec^2).	R	ft/sec^2
HEADER	MAIN HYDEX	Alphanumeric identifier for a subsection of the input card deck.	R	
HYDEXT	MAIN	Control Option. If HYDEXT = 1, subroutine HYDEX is called to create a summary hydraulic extract tape and summarize net flows. If HYDEXT = 0, subroutine HYDEX is not called.	I	
ICYC	MAIN RESTRT	Cycle number (iteration) during execution of the quality program.	I	

VARIABLE	SUBROUTINE	DEFINITION	TYPE	UNITS
ICYCTF	HYDEX	Cycle number stored on unit 4.	I	
INTPUN	MAIN RESTRT	Punch interval for restarting. Restart data is stored on Unit 4 at cycle PUNCYC, and at each INTPUN cycles thereafter.	I	
INTRVL	MAIN	Interval (in cycles) between printouts.	I	
IPRINT	MAIN	Printed output begins at this cycle, and each INTRVL cycles thereafter.	I	
ITAPE	MAIN	Hydraulic parameters are stored on unit 10 beginning at this cycle.	I	
JPRT(I)	MAIN	Specified junctions for which printout is desired. (I = 1,NOPRT).	I	
KTZERO	RESTRT	Variable used temporarily to compute the appropriate value for TZERO in case of restarting	R	
NC	MAIN HYDEX RESTRT	Number of channels in model network.	I	
NCHAN(J,K)	MAIN HYDEX RESTRT	Channel number of the Kth channel entering junction J. (K = 1,5)	I	
NCYC	MAIN	Total number of time steps (cycles to be executed).	I	
NCYCC	MAIN HYDEX	Counter for the number of hydraulic cycles.	I	
NEXIT	MAIN	Counter to determine compatability of channels and junctions. If NEXIT is greater than or equal to 1, execution is terminated.	I	

VARIABLE	SUBROUTINE	DEFINITION	TYPE	UNITS
NJ	MAIN HYDEX RESTRT	Number of junctions in the model network.	I	
NJUNC(N,1)	MAIN HYDEX RESTRT	Lower of the two junction numbers at the ends of channel N.	I	
NJUNC(N,2)	MAIN HYDEX RESTRT	Higher of the two junction numbers at the ends of channel N.	I	
NK	MAIN	Number of coefficients used to specify tidal input. (NK usually equals 7).	I	
NMAX(J)	HYDEX	Hydraulic cycle number at which the maximum head at junction J occurs.	I	
NMIN(J)	HYDEX	Hydraulic cycle number at which the minimum head at junction J occurs.	I	
NODYN	HYDEX	Number of hydraulic time steps per quality time step.	I	
NOPRT	MAIN	Number of junctions for which output is desired.	I	
NS	MAIN	NK/2. Number of Sine (and Cosine) terms in relationship defining tidal input.	I	
NSTART	HYDEX	Starting cycle on the hydraulic extract tape. (Unit 4).	I	
NSTOP	HYDEX	Ending cycle on the hydraulic extract tape. (Unit 4).		

VARIABLE	SUBROUTINE	DEFINITION	TYPE	UNITS
PERIOD	MAIN HYDEX RESTRT	Period of the tidal input. PERIOD is read in as hours, but transformed to seconds within the program.	R	
PUNCYC	MAIN RESTRT	RESTRT is called at cycle PUNCYC and every INTPUN cycles thereafter.	I	
Q(N)	MAIN HYDEX	Flow in channel N.	R	cfs
QEXT(N)	HYDEX	Mean flow in channel N over each quality time step.	R	cfs
QIN(J)	MAIN HYDEX RESTRT	Inflow or withdrawl at junction J. Inflows must be specified as negative numbers, while withdrawls must be positive numbers	R	cfs
QMAX(N)	HYDEX	Maximum flow in channel N over full tidal cycle.	R	cfs
QMIN(N)	HYDEX	Minimum flow in channel N over full tidal cycle.	R	cfs
QNET(N)	HYDEX	Net flow in channel N over full tidal cycle.	R	cfs
R(N)	MAIN HYDEX RESTRT	Hydraulic radius of channel N, taken as the channel depth.	R	ft.
RANGE(J)	HYDEX	The tidal range at junction J. RANGE(J) = YMAX(J) - YMIN(J).	R	ft.
SUMQ	MAIN	Net flow into or out of a junction.	R	
T	MAIN	Total elapsed time. Initialized to equal TZERO and is incremented by DELT at the start of each time step.	R	

VARIABLE	SUBROUTINE	DEFINITION	TYPE	UNITS
T2	MAIN	Total elapsed time for one half step computations. T2 lags T by DELT2.	R	
TZERO	MAIN	Time at which computations begin, Allows starting point to be anywhere on tidal cycle.	R	
TZERO2	RESTRT	Variable used temporarily to compute the appropriate value for TZERO in case of restarting.	R	
V(N)	MAIN HYDEX RESTRT	Mean velocity in channel N.	R	
VEL	MAIN	Velocity. Follows sign convention used for hydraulic outputs.	R	fps
VEXT(N)	HYDEX	Mean velocity in channel N over each quality time step.	R	
VMAX(N)	HYDEX	Maximum velocity in channel N over tidal cycle. If flow reversal occurs in channel N, VMAX(N) will be the maximum positive velocity.	R	
VMIN(N)	HYDEX	Minimum velocity in channel N over tidal cycle. If flow reversal occurs in channel N, VMIN(N) will be the maximum negative velocity	R	
VT(N)	MAIN	Velocity in channel N during half time step.	R	fps
W	MAIN	2π/PERIOD	R	
Y(J)	MAIN HYDEX RESTRT	Head at junction J.	R	ft.
YAVG(N)	HYDEX	Mean head at junction J over tidal cycle.	R	ft.

VARIABLE	SUBROUTINE	DEFINITION	TYPE	UNITS
YMAX(N)	HYDEX	Maximum head at junction J over tidal cycle.	R	ft.
YMIN(N)	HYDEX	Minimum head at junction J over tidal cycle.	R	ft.
YNEW(N)	HYDEX	New name for head at junction J to differentiate it from the head at the same junction at another time step.	R	ft.
YT(J)	MAIN	Head a junction J during one half time step.	R	ft.
Unit 4	HYDEX RESTRT	Serves as restart device in case of premature termination of execution. Otherwise, it is used as the hydraulic extract tape, created to store data for input to the quality program.		
Unit 5	MAIN HYDEX	Used for card input (card reader).		
Unit 6	MAIN HYDEX RESTRT	Used for printed output (printer).		
Unit 8	RESTRT	Used for punched output (card punch).		
Unit 10	MAIN HYDEX	Serves as a temporary record of the hydraulic solution. Pertinent hydraulic parameters are stored for every channel and junction for every cycle beyond ITAPE.		

2.3 COMPUTER REQUIREMENTS

2.3.1 IBM JOB CONTROL LANGAUGE (JCL)

The JCL used to execute program REGAN is as follows

```
//JOB CARD
//EXEC FORTGCLG
//FORT.SYSIN DD *
     program REGAN goes here
//GO.FT06001 DD SYSOUT=A
//GO.SYSIN DD *
     data deck goes here
/*EOF
```

The JCL used to execute program DYNHYD is as follows

```
//JOB CARD
//STEP1 EXEC PGM=DYNHYD
//STEPLIB DD DISP=SHR,VOL=(PRIVATE,RETAIN,SER=REGNA3),
//  UNIT=3330-1,DSN=CNQSQM.LJC.CLARKLIB
```

```
//GO.FT04001 DD DCB=(RECFM=VS,LRECL=504,BLKSIZE=5040,
//  DISP=(NEW,KEEP,KEEP),VOL=SER=USER99,UNIT=3330-1,
//  DSN=CN.EPAXYZ.ACCT.DATA.SET.NAME
```

stores on disk

or

```
//GO.FT04001 DD DCB=(RECFM=VS,LRECL=504,BLKSIZE=5040),
//  DISP=(NEW,KEEP,KEEP),VOL=SER=TAPE##,UNIT=2400,
//  DSN=LEOTAPE,LABEL=(##,SL,EXPDT=98000)
```

stores on tape

```
//DD DSN=SYS2.FTG1LINK,DISP=SHR
//GO.FT10F001 DD DSN=&&HYDTA,DCB=(RECFM=VS,LRECL=504,BLKSIZE=5040),
//  DISP=(NEW,DELETE,DELETE),SPACE=(TRK,(40,40)),UNIT=SYSDA
//GO.FT08F001 DD DUMMY
//GO.FT06F001 DD SYSOUT=A
//GO.FT05F001 DD *
     data deck here
/*EOF
```

CHAPTER 3

STRUCTURE OF THE WATER QUALITY MODEL, DYNDELA

DYNDELA is a quasi-structured program composed of a long main program and 31 subroutines which support various sections of the MAIN. DYNDELA could not be completely structured because of its FORTRAN language and because of its evolutionary history. The general structure of DYNDELA (and the MAIN) is illustrated in Figure 3-1. Table 3-1.A briefly described the MAIN sections. illustrated in Figure 3-1, while Table 3.1.B groups, lists and briefly describes the subroutines.

A more detailed look at the program structure is provided in Table III-2. The function of each subsection in the MAIN is shown in the order in which it is accomplished. In fact, this table is condensed from the comment statements in the program itself. More detailed comments along with program logic itself can be found in the listing.

2.3.2 EXECUTION TIMES

The time required to execute the hydraulic program is dependent on the computer used, the network size, the computational time step, and the length of the run. Typical execution times for DYNHYD are given in Table 2.1 below. DYNHYD requires approximately 130K of storage for execution.

Junctions	Channels	Time Step (secs)	Length of run (hrs)	Execution Time (mins)	Computer
112	170	50	37.5	5	CDC 6600
112	170	50	50.0	8	CDC 6600
112	170	50	25.0	8	IBM 360/65
129	131	90	50.0	1.3	IBM 370/168
133	139	90	25	.8	IBM 370/168
247	306	75	12.5	4	CDC 6600
830	1050	100	25	12	CDC 6600
133	139	90	50	2.4	UNIVAC 1100

TABLE 2.1 DYNHYD EXECUTION TIMES

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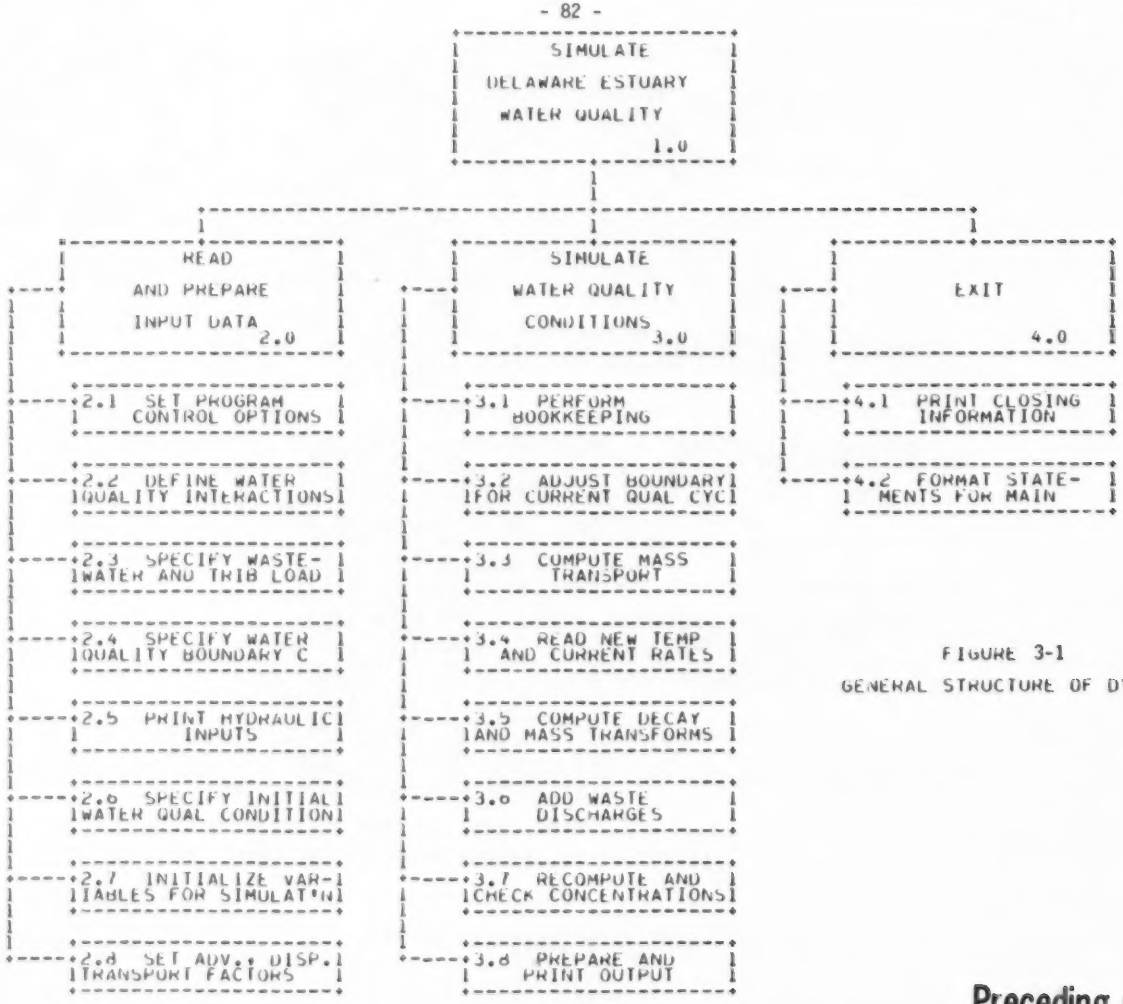

FIGURE 3-1

GENERAL STRUCTURE OF DYNDELA

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TABLE 3-1.A
BRIEF DESCRIPTION OF MAIN SECTIONS

1.0 SIMULATE DELAWARE ESTUARY WATER QUALITY

2.0 READ AND PREPARE INPUT DATA

2.1 SET PROGRAM CONTROL OPTIONS
READS SYSTEM INFORMATION FROM HYDRAULIC PROGRAM AND DATA TO CONTROL SIMULATION

2.2 DEFINE WATER QUALITY INTERACTIONS
READS AND PREPARES DATA TO DEFINE CONSTITUENT INTERACTIONS AND DECAY

2.3 SPECIFY WASTEWATER AND TRIBUTARY LOADS
READS AND PREPARES DATA DESCRIBING MUNICIPAL, INDUSTRIAL, TRIBUTARY, AND STORMWATER LOADS

2.4 SPECIFY WATER QUALITY BOUNDARY CONDITIONS
READS AND PREPARES DATA DESCRIBING WATER QUALITY AT THE SEAWARD AND UPSTREAM BOUNDARIES OF THE NETWORK

2.5 PRINT HYDRAULIC INPUTS
PRINTS TABLE OF NETWORK AND HYDRAULIC DATA GENERATED THROUGH THE HYDRAULIC PROGRAM

2.6 SPECIFY INITIAL WATER QUALITY CONDITIONS
READS AND PREPARES DATA DESCRIBING WATER QUALITY AT THE BEGINNING OF THE SIMULATION PERIOD

2.7 INITIALIZE VARIABLES FOR SIMULATION
PREPARES MODEL PARAMETERS FOR THE SIMULATION

2.8 SET ADVECTIVE AND DISPERSIVE TRANSPORT FACTORS
READS AND PREPARES FACTORS CONTROLLING ADVECTIVE AND DISPERSIVE TRANSPORT OF WATER QUALITY CONSTITUENTS

3.0 SIMULATE WATER QUALITY CONDITIONS

3.1 PERFORM BOOKKEEPING
UPDATES TIME CLOCK AND HYDRAULIC DATA

3.2 ADJUST BOUNDARY CONDITION FOR CURRENT QUALITY CYCLE
UPDATES SEAWARD BOUNDARY CONDITIONS

3.3 COMPUTE MASS TRANSPORT
COMPUTES MASS ADVECTED AND DISPERSED

3.4 READ NEW TEMPERATURE AND CORRECT APPROPRIATE RATES
CHECKS FOR TEMPERATURE UPDATES; READS AND ADJUSTS NEW PARAMETERS IF APPROPRIATE

3.5 COMPUTE DECAY AND MASS TRANSFORMATION
COMPUTES MASS DECAYED AND TRANSFORMED FROM ONE CONSTITUENT TO ANOTHER

3.6 ADD WASTE DISCHARGES
COMPUTES MASS ADDED BY WASTEWATER AND TRIBUTARY DISCHARGES, INCLUDING THE UPSTREAM BOUNDARY

3.7 RECOMPUTE AND CHECK CONCENTRATIONS
RECOMPUTES CONCENTRATIONS AND CHECKS FOR NEGATIVE OR UNREASONABLY HIGH VALUES; CORRECTS FOR MASS DEPLETION ADJUSTMENTS ARISING FROM EARLIER NEGATIVE CONCENTRATIONS

3.8 PREPARE AND PRINT OUTPUT
PRINTS OUT SUMMARY, STATISTIC, AND SLACK

WATER/PROFILE TABLES; PREPARES SUMMARY, SLACK
WATER/PROFILE, AND STATION TIME PLOTS; PREPARES
RESTART FILE

4.0 EXIT

4.1 PRINT CLOSING INFORMATION
PREPARES STATION TIME PLOTS AND CLOSING SYSTEM MESSAGES
4.2 FORMAT STATEMENTS
PROVIDES FORMATS FOR READ AND WRITE STATEMENTS IN
DYNDELA MAIN

TABLE 3-1.B
BRIEF DESCRIPTION OF SUBROUTINES

A.NETWORK SUBROUTINES

1 RMILES
RELATES RIVER MILES WITH MODEL NODES AND PRINTS SCHEMATIC OF NETWORK

B.TRANSPORT SUBROUTINES

1 LDISP
ASSIGNS LONGITUDINAL DISPERSION FACTORS TO MODEL CHANNELS BASED ON FRESHWATER FLOW AT TRENTON

C. WASTE LOAD SUBROUTINES

1 CWASTE
INPUTS, ADJUSTS, ACCUMULATES,AND ANALYZES CONSTANT WASTEWATER AND TRIBUTARY LOADS

2 VWASTE
INPUTS AND ANALYZES VARIABLE WASTEWATER, TRIBUTARY, AND STORMWATER LOADS

3 WWADJ
READS IN AND PREPARES FACTORS TO ADJUST WASTEWATER LOADS BY LOCATION AND BY TYPE (MUN, IND, TRIB, STORM)

D.DECAY SUBROUTINES

1 NORGDK
SET DEFAULT AMMONIFICATION AND ORGANIC NITROGEN SETTLING RATES

2 NITRIF
SET DEFAULT NITRIFICATION RATES AND/OR PATTERN

3 NO3DK
SET DEFAULT NITRATE UPTAKE RATES AND DENITRIFICATION PARAMETERS

4 DENIT
CALCULATE DENITRIFICATION RATES AS FUNCTION OF DO AND TEMP

5 CBODDK
SET DEFAULT CARBONACEOUS DEOXYGENATION AND CBOD SETTLING RATES

6 DOBUDG
SET DEFAULT DO BUDGET PARAMETERS, INPUT OVERRIDING PARAMETERS CORRECT FOR TEMPERATURE AND TO INTERNAL UNITS, AND CALCULATE INSTANTANEOUS RATES AS FUNCTIONS OF DAYLIGHT, AMBIENT DO CONCENTRATION, AND LOCAL HYDRAULICS

7 NORDR
CALCULATE EFFECTS OF REACTIONS WHICH ARE SECOND ORDER AND ABOVE

8 LINK
SET DEFAULT LINKAGES AND FUNCTIONS FOR STANDARD DO BUDGET SIMULATION

9 RATEIN
READ IN DECAY RATES BY EITHER MODEL NODES OR RIVER MILES

10 RXMILE
TRANSFER DECAY RATES ASSIGNED TO RIVER MILES TO APPROPRIATE MODEL NODES

11 TEMPCR
CORRECT DECAY RATES TO AMBIENT TEMPERATURE

12 INUNIT
CHANGE DECAY RATES FROM INPUT UNITS (1/DAY) TO INTERNAL UNITS

13 ALGUPT
SET ALGAL UPTAKE RATES (NOT PROGRAMMED YET)

14 DECAY
PERFORM DECAY AND MASS TRANSFER OPERATIONS

E. DATA OUTPUT SUBROUTINES

1 DKTABL
PRINT APPROPRIATE TABLES OF DECAY RATES
2 DATRF
CREATE SPECIAL OUTPUT DATA BY TRANSFORMING MODEL PREDICTIONS THROUGH COMBINATIONS OF SUMMATIONS, MULTIPLICATIONS, AND LOGARITHMS
3 SWTABL
SET UP SLACK WATER OUTPUT TABLES FOR REQUESTED TIME PERIODS,AND PRINT RESULTING SLACK WATER PREDICTIONS
4 SUMARY
PRINT MINIMUM, MAXIMUM AND AVERAGE CONCENTRATIONS PREDICTED DURING SPECIFIED TIME INTERVALS
5 STATS
PRODUCE TABLE OF STATISTICS FOR CONCENTRATIONS AT SPECIFIED JUNCTIONS DURING TIME PERIODS SPECIFIED FOR SUMARY
6 ORDER
PLACE CONCENTRATIONS IN ASCENDING ORDER FOR STATS
7 SUMPLT
PRODUCE PROFILE PLOTS OF THE TABLES GENERATED BY SUMARY
8 SWPLOT
PRODUCE PROFILE PLOTS OF THE TABLES GENERATED BY SWTABL
9 PLOTER
PRODUCE TIME HISTORY PLOTS AT SPECIFIED MODEL NODES FOR SPECIFIED TIME INTERVALS
10 CURVE
ENTRY TO GENERALIZED PRINTER PLOT ROUTINE (CALLS PINE, SCALE, PPLOT)
11 PINE
CONNECT DATA POINTS ON PRINTER PLOT (NOT CALLED IN DYNDEL)
12 SCALE
SETS UP CONVENIENT AXES FOR PLOTS
13 PPLOT
PRODUCES GRAPH FOR GIVEN MODEL PREDICTIONS AND OBSERVED DATA POINTS

TABLE 3.2

DETAILED STRUCTURE OF DYNDELA

PROGRAM DYNDELA
ENVIRONMENTAL PROTECTION AGENCY
DYNAMIC WATER QUALITY MODEL

1.0
SIMULATE DELAWARE ESTUARY WATER QUALITY

SECTION 2.0
READ AND PREPARE INPUT DATA

SECTION 2.1
SET PROGRAM CONTROL OPTIONS

***** 2.1.1 OPEN FILES AND ARRAYS

***** 2.1.2 READ AND MANIPULATE HYDRAULIC AND NETWORK DATA

***** 2.1.3 READ INDEPENDENT CONTROL PARAMETERS

***** 2.1.4 READ PRINTOUT CONTROL PARAMETERS

***** 2.1.5 READ PLOTTER CONTROL PARAMETERS

SECTION 2.2
DEFINE WATER QUALITY INTERACTIONS

***** 2.2.1 DEFINE AND LINK QUALITY CONSTITUENTS

***** 2.2.2 READ CONSTITUENT DECAY RATES

***** 2.2.3 PRINT AND ADJUST DECAY RATES

SECTION 2.3
SPECIFY WASTEWATER AND TRIBUTARY LOADS

***** 2.3.1 READ FACTORS TO ADJUST INPUT LOADINGS BY ZONE AND TYPE

***** 2.3.2 READ, ADJUST, AND PRINT CONSTANT INPUT LOADS

***** 2.3.3 ANALYZE CONSTANT INPUT LOADS BY TYPE AND ZONE

***** 2.3.4 READ AND PRINT VARYING INPUT LOADS

***** 2.3.5 ANALYZE VARYING INPUT LOADS BY TYPE, ZONE, AND PERIOD

SECTION 2.4
SPECIFY WATER QUALITY BOUNDARY CONDITIONS

***** 2.4.1 READ BOUNDARY CONTROL PARAMETERS

***** 2.4.2 READ AND SET SEAWARD BOUNDARY CONCENTRATIONS

***** 2.4.3 READ AND SET UPSTREAM BOUNDARY LOAD

***** 2.4.4 PRINT BOUNDARY CONDITIONS

SECTION 2.5
PRINT HYDRAULIC INPUTS

SECTION 2.6
SPECIFY INITIAL WATER QUALITY CONDITIONS

***** 2.6.1 READ INITIAL CONDITIONS

***** 2.6.2 DUPLICATE CONSTITUENT CONCENTRATIONS

***** 2.6.3 READ FACTORS AND ADJUST INITIAL CONCENTRATIONS

***** 2.6.4 PRINT INITIAL QUALITY CONCENTRATIONS

SECTION 2.7
INITIALIZE VARIABLES FOR SIMULATION

***** 2.7.1 INITIALIZE COUNTERS AND FLAGS

***** 2.7.2 CALCULATE INITIAL VOLUMES AND MASSES

***** 2.7.3 PREPARE INFLOWS AND LOADS

***** 2.7.4 STORE INITIAL CONDITIONS TO EXTRACT FIRST TIDAL CYCLE

***** 2.7.5 POSITION VARIABLES AND UNITS FOR RESTART RUNS

SECTION 2.8
SET ADVECTIVE AND DISPERSIVE TRANSPORT FACTORS

***** 2.8.1 READ CONSTANT ADVECTION AND EDDY DIFFUSION FACTORS

***** 2.8.2 SET VARYING ADVECTION FACTORS

***** 2.8.3 PREPARE VARYING LONGITUDINAL DISPERSION FACTORS

***** 2.8.4 PRINT ADVECTIVE AND DISPERSIVE TRANSPORT FACTORS

***** 2.8.5 CONVERT LONGITUDINAL DISPERSION FACTORS TO INTERNAL UNITS

SECTION 3.0

SIMULATE WATER QUALITY CONDITIONS

MAIN QUALITY LOOP

SECTION 3.1
PERFORM BOOKKEEPING

3.1.1 UPDATE CLOCK TIME TO END OF CURRENT QUALITY CYCLE

3.1.2 READ SYSTEM CONDITIONS

SECTION 3.2
ADJUST BOUNDARY CONDITION FOR CURRENT QUALITY CYCLE

3.2.1 CHECK BOUNDARY CONDITION FOR NODE 1

3.2.2 CHECK BOUNDARY CONDITION FOR NODE 2

3.2.3 ADJUST TIDAL COUNTER TO END OF CURRENT QUALITY CYCLE

SECTION 3.3
COMPUTE MASS TRANSPORT

3.3.1 COMPUTE ADVECTIVE TRANSPORT FACTORS

3.3.2 COMPUTE MASS ADVECTED AND DISPERSED

SECTION 3.4
READ NEW TEMPERATURE AND CORRECT APPROPRIATE RATES

***** 3.4.1 CHECK FOR NEW TEMPERATURE

***** 3.4.2 READ NEW PARAMETERS AND SETUP RATES

***** 3.4.3 ADJUST RATES TO NEW TEMPERATURE

***** 3.4.4 PRINT UPDATED DECAY TABLE

***** 3.4.5 CORRECT RATES TO INTERNAL UNITS

SECTION 3.5
COMPUTE DECAY AND MASS TRANSFORMATION

***** 3.5.1 COMPUTE AMBIENT RATES

***** 3.5.2 APPLY DECAY RATES AND COMPUTE NEW MASS

SECTION 3.6
ADD WASTE DISCHARGES

***** 3.6.1 ADD VARYING DISCHARGES (INCLUDING UPSTREAM BOUNDARY LOAD)

***** 3.6.2 ADD CONSTANT WASTEWATER LOADS

SECTION 3.7
RECOMPUTE AND CHECK CONCENTRATIONS

***** 3.7.1 UPDATE JUNCTION VOLUME AND NEW CONCENTRATIONS

***** 3.7.2 PREVENT NEGATIVE CONCENTRATION AND SUPERSATURATION

***** 3.7.3 PREVENT UNREASONABLY HIGH CONCENTRATIONS

SECTION 3.8

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                    PREPARE AND PRINT OUTPUT

***** 3.8.1  WRITE UNIT 9 FOR RESTARTS

***** 3.8.2  PRINT SUMMARIES AND STATISTICS

***** 3.8.3  WRITE UNIT 11 FOR STATION TIME PLOTS

***** 3.8.4  READ NEW OBSERVED DATA FOR SW PLOTS

***** 3.8.5  PRINT SLACK WATER / PROFILE TABLES

***** 3.8.6  WRITE SLACK WATER / PROFILE PLOTS ON UNIT 22

                    END OF MAIN QUALITY LOOP

                          SECTION 4.0
                             EXIT

                          SECTION 4.1
                   PRINT CLOSING INFORMATION

                          SECTION 4.2
                       FORMAT STATEMENTS

***** 4.2.1  FORMAT CARDS FOR READ STATEMENTS

***** 4.2.2  FORMAT CARDS FOR WRITE STATEMENTS
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CHAPTER 4

PREPARATION OF INPUT DATA FOR DYNDELA

4.1 DESCRIPTION OF CARD GROUPINGS

This chapter describes the input data required to run DYNDELA. The data stream is divided into seven card groups, each controlled by a different section of the program. Each card group is further divided into subsections, most of which correspond to a unique subsection of the program. An overview of the grouping is provided in Table 4-1.

Card Group I provides program control information. It stipulates the length and timing of the simulation, the parameters interfacing the stored hydraulic and network data, and the types of printed and plotted output desired. Further options for later manipulation of initial conditions and input loads are provided.

Card Group II provides the definition and linkage of the water quality constituents. It stipulates how the constituents interact with each other and what water quality processes they undergo. Detailed kinetic information, including temperature dependence, is provided. Default values can be selected for standard D.O. Budget simulations.

Card Group III specifies the location and quality of constituent loads through wastewater discharges, tributary inflows, and storm-water runoff events. To simplify waste load allocation runs, parameters can be set to selectively modify constituent loads based on location and/or source type.

Card Group IV describes the seaward boundary concentrations and the upstream boundary loads. All boundaries can vary throughout the simulation.

Card Group V designates the initial water quality conditions. Factors can be included to modify the initial conditions of a constituent based on its location.

Card Group VI stipulates the advective and dispersive transport factors to be used in the simulation. The longitudinal dispersion factors are distributed spatially based on freshwater flow at Trenton. The advective factors vary spatially and with tidal direction in the salinity intrusion region. This calibrated variation has not been hard-coded; it must be included in the input stream as in the examples provided later.

Card Group VII provides new water quality information which becomes applicable at various time intervals into the simulation. Each new water temperature input allows the respecification of nitrification rates as well as all D.O. budget parameters, including algal concentrations, photosynthesis and respiration rates, euphotic depths, wind speeds, sediment oxygen demand rates, and reaeration rates. New observed data for each new slack water/profile plot can be read in throughout the simulation.

Special mention should be made concerning restart runs. At the end of each simulation, all constant waste loads, water quality concentrations, and advective transport factors are written onto Unit 9. If Unit 9 has been defined properly in the job control language (JCL), then this information is saved for later input into a sequential run. The sequential restart runs (for KZØP=1 on Card I.C.2) read constant waste loads, water quality concentrations, and advective transport factors from Unit 8, which must be defined properly in the JCL. If KZØP=2 then only water quality concentrations and advective transport factors are read from Unit 8, allowing new wastewater loads to be included with Card Group III.

This alternative form of data input for restart runs will, of course, alter the normal input of data cards. The initial cycle

number (Card I.C.2) is not 1, but n+1, where n is the number of cycles completed in previous runs. Consequently, variable waste loads and boundaries should all be referenced to cycle 1 on the first of the series. If time plots are desired, then specifications for the present run should be referenced to cycle 1 on the first run of the series. If time plots were saved from the previous runs (with proper specification of Unit 11 in the JCL), then the same plotting junctions must be specified in the original sequence for all succeeding restart runs.

Finally, since restart runs read certain data from Unit 8, these data must be deleted from the card input. For KZØP=1, all constant wastewater cards should be eliminated, since they will be overridden by data from Unit 8. For KZØP not equal to 0 (i.e. all restart runs), the initial conditions and varying advections factors must be deleted from card input. The actual cards to be eliminated are specified in Sections, D, F, and G below.

Finally, all integer variables (those whose first letter is I, J, K, L, M, or N) must be right-hand justified on the cards or card images.

TABLE 4-1
OVERVIEW OF CARD GROUPS

CARD GROUP	MAIN CONTROL SECTION	INPUT DESCRIPTION
I	2.1	PROGRAM CONTROL OPTIONS
I.A	2.1.2	ALPHANUMERIC INFORMATION
I.B	2.1.2	HYDRAULIC AND NETWORK PARAMETERS
I.C	2.1.3	SIMULATION CONTROL PARAMETERS
I.D	2.1.4	PRINTOUT CONTROL PARAMETERS
I.E	2.1.5	PLOTTER CONTROL PARAMETERS
II	2.2	WATER QUALITY CONSTITUENT DEFINITION
II.A	2.2.1	CONSTITUENT SPECIFICATIONS
II.B	2.2.2	CONSTITUENT DECAY RATES
III	2.3	WASTEWATER AND TRIBUTARY LOADS
III.A	2.3.1	LOAD ADJUSTMENT FACTORS
III.B	2.3.2	CONSTANT INPUT LOADS
III.C	2.3.4	VARIABLE INPUT LOADS
IV	2.4	WATER QUALITY BOUNDARY CONDITIONS
IV.A	2.4.1	BOUNDARY CONTROL PARAMETERS
IV.B	2.4.2	JUNCTION 1 SEAWARD BOUNDARY
IV.C	2.4.2	JUNCTION 2 SEAWARD BOUNDARY
IV.D	2.4.3	UPSTREAM JUNCTION BOUNDARY
V	2.6	INITIAL WATER QUALITY CONDITIONS
V.A	2.6.1	INITIAL CONCENTRATIONS
V.B	2.6.3	ADJUSTMENT FACTORS
VI	2.8	TRANSPORT FACTORS
VI.A	2.8.1	CONSTANT TRANSPORT FACTORS
VI.B	2.8.2	VARYING ADVECTION FACTORS
VI.C	2.8.3	VARYING LONGITUDINAL DISPERSION FACTORS
VII	3.0	TIME VARYING INFORMATION
VII.A	3.4.1	NEW WATER TEMPERATURE
	2	NEW WATER QUALITY PARAMETERS
VII.B	3.8.4	NEW OBSERVED DATA

4.2 CARD GROUP I
PROGRAM CONTROL

TABLE 4-2
CARDS IN GROUP I

CARDS	DESCRIPTION
I.	SECTION HEADER
A.1	ALPHANUMERIC INFORMATION
B.1	SUBSECTION HEADER
B.2	HYDRAULIC AND NETWORK PARAMETERS
B.3	TIDAL BOUNDARY PARAMETERS
C.1	SUBSECTION HEADER
C.2	SIMULATION CONTROL
C.3	CLOCK TIME
C.4	CONTROL FOR ADJUSTMENT OF INITIAL CONDITIONS
C.5	CONTROL FOR ADJUSTMENT OF INPUT LOADS BY TYPE
C.6	CONTROL FOR ADJUSTMENT OF INPUT LOADS BY REACH
C.7	VARYING WASTE LOAD CONTROL
D.1	SUBSECTION HEADER
D.2	PRINTOUT SUPPRESSION
D.3	RESTART FILE CONTROL
D.4	CARD GROUP HEADER
D.5	SUMMARY 1 CONTROL
D.6	SUMMARY 1 TABLES
D.7	SUMMARY 2 CONTROL
D.8	SUMMARY 2 TABLES
D.9	JUNCTION STATISTICS CONTROL
D.10	JUNCTIONS FOR STATISTICS
D.11	CARD GROUP HEADER
D.12	SLACK WATER/PROFILE OUTPUT
D.13	SNAPSHOT JUNCTIONS
D.14	OUTPUT TRANSFORMATION-ADDITION
D.15	OUTPUT TRANSFORMATION-MULTIPLICATION
D.16	OUTPUT TRANSFORMATION-LOGARITHMS
E.1	SUBSECTION HEADER
E.2	PLOTTER CONTROL
E.3	STATION TIME PLOT INFORMATION
E.4	PROFILE PLOT CONTROL
E.5	HEADER FOR OBSERVED DATA
E.6	RIVER MILES FOR OBSERVED DATA
E.7	HEADER FOR TRANSECT POSITIONS
E.8	OBSERVED DATA

CARDS	COLUMNS	VARIABLE NAME	DESCRIPTION
			VARIABLES IN CARD GROUP I
I.			SECTION HEADER
	1-80	ALPHA(I)	Alphanumeric identifier for section. Printed as section heading in output (I=1,20).
A.1,2			ALPHANUMERIC INFORMATION
	1-80	ALPHA(I)	Alphanumeric identifiers for quality run. Printed in output (I=41-60,61-80)
B.1			SUBSECTION HEADER
	1-80	HEADER	Alphanumeric identifier for subsection of card deck
B.2			HYDRAULIC AND NETWORK PARAMETERS
	1-5	NJ	Total number of junctions in network. Identical to NJ in program DYNHYD
	6-10	NC	Total number of channels in network. Identical to NC in program DYNHYD.
	11-15	NSTART	Cycle number from hydraulic solution which is the initial cycle on the hydraulic extract input tape 4. Identical to NSTART in Subroutine HYDEX of program DYNHYD
	16-20	NSTOP	Cycle number from hydraulic solution which is the final cycle on the hydraulic extract tape 4. Identical to NSTOP in HYDEX
	21-25	NODYN	Number of hydraulic time steps per quality time step. Identical to NODYN in HYDEX
	26-30	NZ1	The first zone in the network, used for averaging wastewater information.
	31-35	NZ2	The last zone in the network.

CARDS	COLUMNS	VARIABLE NAME	DESCRIPTION
	36-40	NMODE	Network mode used: NMODE=1 (one-dimensional network) or NMODE=2 (two-dimensional network).
B.3			TIDAL BOUNDARY PARAMETERS
	1-45	-	Comments
	46-50	NSFLD	The value of NTAG at the start of flood tide at the main seaward boundary (NTAG is a counter, in quality time steps, which repeats every tidal cycle, relating quality solution to extracted hydraulic solution)
	51-55	NSEBB	The value of NTAG at the start of ebb tide at the main seaward boundary.
	56-60	NDURFL	The duration of flood tide in quality cycles
	61-65	NENDE	The value of NTAG at the end of ebb tide at the main seaward boundary.
C.1			SUBSECTION HEADER
	1-80	HEADER	Alphanumeric identifier for subsection of card deck.
C.2			SIMULATION CONTROL
	1-5	NRSTRT	Cycle number on input tape 3 (hydraulic extract tape) at which quality run is to begin (NSTART <= NRSTRT <= NSTOP).
	6-10	INCYC	Initial quality cycle number. For first run of a series INCYC should equal 1. For continuation or restart runs, INCYC should equal x+1 where x equals the number of cycles completed previously.
	11-15	NQCYC	Total number of quality cycles to be completed. NQCYC must include all cycles previously completed, i.e., NQCYC equals INCYC plus the additional cycles to be completed in the current run.
	16-20	KZOP	Control option for restart runs; KZOP = 0 for independent runs or the first run of a series; KZOP = 1 for restart

CARDS	COLUMNS	VARIABLE NAME	DESCRIPTION
			runs where constant waste loads, initial conditions, and transport factors are read from unit 8 (which was written at the close of the previous run in the series); KZOP = 2 for restart runs where new constant waste loads are read in from unit 5; initial conditions and transport factors are read from unit 8.
	21-25	KDCOP	Control option for handling of depletion corrections. Negative mass in a junction resulting from decay is always corrected up to 0. If the decay is accompanied by a mass transfer (Card II.A.5), then KDCOP should be set to 3; this will track the extra mass introduced during depletion corrections, and subtract it from the junction whenever possible. When decay is not accompanied by mass transfer, KDCOP should be set equal to 2 or 1, to suppress depletion warnings, or not
	26-30	NTAG	Counter which is reset to zero at the completion of each full tidal cycle. NTAG varies between zero and NSPEC where NSPEC is the number of quality cycles per tidal cycle.
C.3			CLOCK TIME
	1-45		Comments
	46-50	CTIME1	Time of day at the beginning of the simulation; 0.0 = midnight, 6.5 = 6:30 am, 22.0 = 10:00 pm, etc.
	51-55	TSRISE	Time of day sunrise occurs.
	56-60	TSSET	Time of day sunset occurs.
C.4			CONTROL FOR ADJUSTMENT OF INITIAL CONDITIONS
	1-45		Comments
	46-50	NGROUP(1)	The number of groups of junction numbers or river miles (up to 30) for which it is desired to increment the initial concentrations of constituent I; if groups are to be read in by river mile, then NGROUP(I) = 100+ the number of desired groups.
	51-55	NGROUP(2)	
	56-60	NGROUP(3)	
	61-65	NGROUP(4)	
	66-70	NGROUP(5)	
C.5			CONTROL FOR ADJUSTMENT OF INPUT LOADS BY TYPE

CARDS	COLUMNS	VARIABLE NAME	DESCRIPTION
	1-45		Comments
	46-50	LGROUP(1)	Switch designating whether or not discharges of type I are to be incremented by the factors controlled by MGROUP(I). LGROUP(I) = 1 or 0 means discharge type 1 will be incremented, or not. I = 1 (municipal), 2 (industrial), 3 (tributory), or 4 (storm runoff)
	51-55	LGROUP(2)	
	56-60	LGROUP(3)	
	61-65	LGROUP(4)	
C.6			CONTROL FOR ADJUSTMENT OF INPUT LOADS BY REACH
	1-45	-	COMMENTS
	46-50	MGROUP(1)	The number of groups of junction numbers or river miles (up to 30) for which it is desired to increment the input loads of constituent I; if groups are to be read in by river mile, then MGROUP(I)=100+ the number of desired groups.
	51-55	MGROUP(2)	
	56-60	MGROUP(3)	
	61-65	MGROUP(4)	
	66-70	MGROUP(5)	
C.7			VARYING WASTE LOAD CONTROL
	1-45	-	Comments
	46-50	NJVDIS	The number of varying discharges for which information will be furnished in Section 3.
	51-55	ISAN	Quality cycle at which the first variable waste summary period begins
	56-60	ISIN	Length of variable waste summary periods, in quality time steps.
	61-65	ININ	Number of variable waste summary periods to be analyzed and presented in tabular form
	66-70	IRUN	Flag to halt the simulation after the variable waste summary section is completed; if IRUN > 0 the simulation is stopped.

CARDS	COLUMNS	VARIABLE NAME	DESCRIPTION
D.1			SUBSECTION HEADER
	1-80	HEADER	Alphanumeric identifier for subsection of card deck
D.2			PRINTOUT SUPPRESSION
			Flags to suppress printout of data from the various sections:
	1-5	KDELP1	Program control information
	6-10	KDELP2	Table of decay rates at ambient temp
	11-15	KDELP3	Constant wastewater input data
	16-20	KDELPC	Constant and variable wastewater input summary tables
	21-25	KDELP4	Water quality boundary conditions
	26-30	KDELP5	Hydraulic input data
	31-35	KDELP6	Adjustment factors for initial conditions
	36-40	KDELP8	Table of transport factors
	41-45	KDELP9	Constituent mass and depleted mass, computed each time the restart file is written.
D.3			RESTART FILE CONTROL
	1-45	-	Comments
	46-50	IWRITE	Cycle number at which quality data is stored on restart file for first time.
	51-55	MSPEC	Interval, in quality cycles (time steps) between each storage of data on the restart file. Data is updated on the restart file at cycles IWRITE + n * MSPEC, where n is a positive integer.
D.4			CARD GROUP HEADER
	1-80	HEADER	Alphanumeric identifier for output

CARDS	COLUMNS	VARIABLE NAME	DESCRIPTION
			summary card group.
D.5			SUMMARY 1 CONTROL
	1-45	-	Comments
	46-50	NSUM1	Number of summary output tables produced by summary 1 subsections.
D.6			SUMMARY 1 TABLES
	1-5	IPRT1(N)	First cycle in Summary 1 Table N.
	6-10	LPRT1(N)	Last cycle in Summary 1 Table N.
	11-15	IPLT1(N)	Flag to control plotting of Summary 1 Table N; 1 = plot Table N; 0 = do not plot Table N.
	16-20	ISTAT1(N)	Flag to control statistical analysis for specified junctions during period covered by Summary 1 Table N. 1 = perform statistical analysis; 0 = do not perform statistical analysis.
			Card D.6 is repeated NSUM1 times (see Card D.5), N = 1,2,..., NSUM1 (10 maximum).
D.7			SUMMARY 2 CONTROL
	1-45	-	Comments
	46-50	NSUM2	Number of summary output tables produced by SUMMARY 2 subsections.
D.8			SUMMARY 2 TABLES
	1-5	IPRT2(N)	First cycle in Summary 2 Table N.
	6-10	LPRT2(N)	Last cycle in Summary 2 Table N.
	11-15	IPLT2(N)	Flag to control plotting of Summary 2 Table N; 1 = plot Table N; 2 = do not plot Table N.

CARDS	COLUMNS	VARIABLE NAME	DESCRIPTION
	16-20	ISTAT2(N)	Flag to control statistical analysis for specified junctions during period covered by Summary 2 Table N. 1 = perform statistical analysis; 0 = do not perform statistical analysis.
			Card D.8 is repeated NSUM2 times (see Card D.7), N = 1,2,..., NSUM2(10 maximum).
D.9			JUNCTION STATISTICS CONTROL
	1-45	-	Comments
	46-50	NJSTAT	Number of junctions for which statistical analyses are desired.
	51-55	ISTAT(1)	Flags designating whether to perform statistical analysis on constituent 1. ISTAT(I) = 1,0 to perform statistics, or not.
	56-60	ISTAT(2)	
	61-65	ISTAT(3)	
	66-70	ISTAT(4)	
	71-75	ISTAT(5)	
D.10			JUNCTIONS FOR STATISTICS
	1-5	JUNCST(1)	Junctions for which statistical analyses are desired. Up to 50 junctions can be listed.
	6-10	JUNCST(2)	
	11-15	JUNCST(3)	
	.	.	
	.	.	
	76-80	JUNCST(16)	
	.	.	
	.	.	
	1-5	JUNCST(NJSTAT)	
			Card D.10 is deleted if NJSTAT (Card D.9) equals 0; for NJSTAT from 1 to 16, Card D.10 is read once; for NJSTAT from 17 to 32, Card D.10 is read twice; for NJSTAT from 33 to 48, Card D.10 is read three times; and for NJSTAT of 49 or 50, Card D.10 is read four times.
D.11			CARD GROUP HEADER
	1-80	HEADER	Alphanumeric identifier for slack water output card group.
D.12			SLACK WATER/PROFILE OUTPUT
	1-5	NPC(I)	Cycle number at which a slack water output begins

CARDS	COLUMNS	VARIABLE NAME	DESCRIPTION
			If specifying a slack water table, NPC(I) should correspond to either high or low water slack conditions at the seaward boundary of the model. For high slack, NPC(I) should equal NSEBB-NTAG + n * NSPEC, where n is a positive integer; for low slack, NPC(I) should equal NSFLD - NTAG + n * NSPEC.
	6-10	NOPPT(I)	The number of junctions to be included in a snapshot table (maximum=30)
	11-15	KSL(I)	Slack water specifications: for KSL(I)=1, table will be high slack; for KSL(I)=3, table will be low slack; for KSL(I)=0, a snapshot table will be produced.
	16-20	KTABLE(I)	Parameter specifying plotting control information for table I: KTABLE(I) = 0: table I is not plotted; KTABLE (I) = 2: table I is plotted; KTABLE(I) = 3: constituents 1-4 from table I are plotted, while constituent 5 is saved to be plotted as an overlay with constituent 5 in table I+1; KTABLE(I)=4: constituent 5 from tables I and I-1 are plotted together (KTABLE(I-1) must be 3).
D.13			SNAPSHOT JUNCTIONS
	1-5	JPRT(I,1)	Junction numbers to be included in snapshot table I. This card is deleted for slack water tables (where NOPRT(I)=0). Up to 30 junctions may be specified, taking up to three consecutive cards.
	6-10	JPRT(I,2)	
	.	.	
	.	.	
	.	.	
	.	.	
	66-70	JPRT(I,NOPRT(I))	

Cards D.12 and D.13 are repeated for as many tables as are desired. This section is ended with a card containing blanks in columns 1 through 20 with optional comments in columns 21-80.

D.14			OUTPUT TRANSFORMATION-ADDITION
	1-45	-	comments

CARDS	COLUMNS	VARIABLE NAME	DESCRIPTION
	46-50	IADDTR(1)	Number designating a special output constituent created by the addition transformation option. This new constituent is created for output only by adding together the concentrations of designated constituent numbers.
	51-55	IADDTR(2)	A second constituent number for the output constituent IADDTR(1).
	56-60 61-65 66-70 71-75 76-80	IADOP(1) IADOP(2) IADOP(3) IADOP(4) IADOP(5)	Flags designating whether to include the concentration of constituent I in the summation creating the special output constituent IADDTR(1). If IADOP(I) = 1, constituent I is included in the summation; if IADOP(I) = 0, constituent I is excluded (constituents I can represent either original model constituents or special output constituents from earlier multiplication and/or logarithm transformation steps.)
D.15			OUTPUT TRANSFORMATION-MULTIPLICATION
	1-45	-	comments
	46-50	MLTTRF	Sequence number for transforming data by multiplication. If MLTTRF = 0, this transformation option is not used. If MLTTRF = 2, data is transformed by either the addition or the logarithm option before being transformed by multiplication.
	51-55 56-60 61-65 66-70 71-75	DMULT(1) DMULT(2) DMULT(3) DMULT(4) DMULT(5)	Factors which multiply the concentration of constituent I to create special output constituent (constituents I can represent either original model constituents or special output constituents from earlier addition and/or logarithm transformation steps.)
D.16			OUTPUT TRANSFORMATION-LOGARITHMS
	1-45	-	comments
	46-50	LOGTRF	Sequence number for transforming data by taking logarithms (base 10). If LOGTRF = 0, this transformation option is not used. If LOGTRF = 3, data is transformed by the

CARDS	COLUMNS	VARIABLE NAME	DESCRIPTION
			addition and the multiplication options before this step.
	51-55	LOGOP(1)	Flags designating whether to take the logarithm (base 10) of constituent I to create special output constituent (constituents I can represent either original model constituents or special output constituents from earlier addition and/or multiplication transformation steps). LOGOP = 1: take log; = 0: do not take log.
	56-60	LOGOP(2)	
	61-65	LOGOP(3)	
	66-70	LOGOP(4)	
	71-75	LOGOP(5)	
E.1			SUBSECTION HEADER
	1-80	HEADER	Alphanumeric identifier for subsection of card deck.
E.2			PLOTTER CONTROL
	1-5	NGCYC	Number of station time plots to be produced (maximum = 20)
	6-10	MGCYC	Flag designating whether to produce profile plots of slackwater and snapshot tables. If MGCYC = 1, all such tables are plotted; if MGCYC = 0, no profile plots are produced.
	11-15	NDATA	Number of stations at which observed data is to be supplied for inclusion in profile plots (maximum = 16). If NDATA = 0, no observed data is read in.
	16-20	NDACYC	Number of quality cycles (time steps) for which observed data applies. On cycle NDACYC + 1, new observed data is read in.
	21-25	KPLOP	Parameter determining background grid for plots. If KPLOP = 0, background on plots is blank. KPLOP = 1, 2, or 3 produces high, medium, or low density background grids.
	26-30	GMAX(1)	Maximum and minimum values for the vertical axes on plots of constituents I.
	31-35	GMIN(1)	
	36-40	GMAX(2)	
	41-45	GMIN(2)	
	46-50	GMAX(3)	
	51-55	GMIN(3)	
	56-60	GMAX(4)	
	61-65	GMIN(4)	
	66-70	GMAX(5)	

CARDS	COLUMNS	VARIABLE NAME	DESCRIPTION
	71-75	GMIN(5)	
E.3			STATION TIME PLOT INFORMATION
	1-5	NGJUNC(I)	Junction number for station time plot I.
	11-20	NGST(I)	Cycle number at which station time plot I begins
	21-25	NGEND(I)	Cycle number at which station time plot I ends.
	26-30	NGINT(I)	Interval in cycles between entries on station time plot I.
	31-35	NGCON(I,1)	Flags designating whether to plot constituent J as part of station time plot I. If NGCON(I,J) = 1, constituent J is plotted; if NGCON(I,J) = 0, constituent J is not plotted.
	36-40	NGCON(I,2)	
	41-45	NGCON(I,3)	
	46-50	NGCON(I,4)	
	51-55	NGCON(I,5)	
		Card E.3 is repeated NGCYC times. If NGCYC = 0, card E.3 is not read.	
E.4			PROFILE PLOT CONTROL
	1-45	-	comments
	46-50	IGCF(1)	Flag designating whether to plot constituent I as part of profile and summary plots. If IGCF(I) = 1, constituent I is included with profile and summary plots; if IGCF(I) = 0, constituent I is not plotted.
	51-55	IGCF(2)	
	56-60	IGCF(3)	
	61-65	IGCF(4)	
	66-70	IGCF(5)	
E.5			HEADER FOR OBSERVED DATA
	1-80	HEADER	Alphanumeric identifier for observed data section of card deck.
		Cards E.4 and E.5 are not read if MGCYC = 0.	
E.6			RIVER MILES FOR OBSERVED DATA
	1-5	RDATA(1)	River mile for observed data at location (K = 1-16).
	6-10	RDATA(2)	
	.	.	
	.	.	
	.	.	
	76-80	RDATA(16)	

CARDS	COLUMNS	VARIABLE NAME	DESCRIPTION
E.7			HEADER FOR TRANSECT POSITIONS
	1-80	HEADER	Alphanumeric identifier for transect position of observed data.
E.8			OBSERVED DATA
	1-5	DATA(I,J,1,L)	Observed data at transect position L and longitudinal location K (third index), for constituent J at date I. location K here must correspond to RDATA (K) on Card E.6. The index I(=1,2,3) can stand for either three dates or the high, average, and low data points taken during a sampling period.
	6-10	DATA(I,J,2,L)	
	.	.	
	.	.	
	.	.	
	.	.	
	.	.	
	.	.	
	76-80	DATA(I,J,16,L)	

Cards E.7 and E.8 are not read if MGCYC = 0 (signifying no profile plots). If MGCYC = 1, but NDATA = 0 (signifying no observed data on the profile plots), then Cards E.6, E.7 and E.8 are not read. If MGCYC = 1, NDATA > 0, and NMODE = 1, then Card E.7 is read once and Card E.8 is read 15 times (Date I = 1, constituent J = 1-5; and Date I = 2, constituent J = 1-5; and Date I = 3, constituent J = 1-5). L = 1, signifying center channel data.

If MGCYC = 1, NDATA > 0, and NMODE = 2, then the set of card E.7 and Cards E.8 (fifteen) is read in three times, for L = 1 (center channel), L = 2 (Pennsylvania side), and L = 3 (New Jersey side).

4.3 CARD GROUP II
WATER QUALITY CONSTITUENT DEFINITION

TABLE 4-3
CARDS IN GROUP II

CARDS	DESCRIPTION
II.	SECTION HEADER
A.1	SUBSECTION HEADER
A.2	BASIC CONSTITUENT HANDLING
A.3	CONSTITUENT IDENTIFICATION
A.4	CONSTITUENT INFORMATION
A.5	CONSTITUENT LINKAGE
A.6	FUNCTION OPERATORS
A.7	CONCENTRATION LIMITS
A.8	WATER TEMPERATURE
B.1	SUBSECTION HEADER
B.2	CONSTITUENT K REACTION VARIABILITY
B.3.N.M	REACTION TRACK 1 : STANDARD INPUT
B.3.1.1	CONSTITUENT K REACTION RATES BY JUNCTIONS
B.3.1.2	CONSTITUENT K REACTION RATES BY MILES
B.3.2.1	ADDITIONAL REACTION 1: VARIABILITY
B.3.2.2	ADDITIONAL REACTION 1: RATES BY JUNCTIONS
B.3.2.3	ADDITIONAL REACTION 1: RATES BY MILES
B.3.3.1	ADDITIONAL REACTION 2: VARIABILITY
B.3.3.2	ADDITIONAL REACTION 2: RATES BY JUNCTIONS
B.3.3.3	ADDITIONAL REACTION 2: RATES BY MILES
B.3.4.M	DISSOLVED OXYGEN BUDGET PARAMETERS
B.3.5	HIGHER ORDER REACTION KINETICS
B.3.6	DENITRIFICATION PARAMETERS
B.4.N.M	REACTION TRACK 2 : DEFAULT INPUT
B.4.1.1	ORGANIC NITROGEN SETTLING VARIABILITY
B.4.1.2	ORGANIC NITROGEN SETTLING RATES BY JUNCTIONS
B.4.1.3	ORGANIC NITROGEN SETTLING RATES BY MILES
B.4.2	NITRIFICATION RATES FOR STANDARD PATTERN
B.4.3.1	CBOD SETTLING VARIABILITY
B.4.3.2	CBOD SETTLING RATES BY JUNCTIONS
B.4.3.3	CBOD SETTLING RATES BY MILES
B.4.4.M	DISSOLVED OXYGEN BUDGET PARAMETERS

TABLE 4-4
CARDS FOR DISSOLVED OXYGEN BUDGET

CARDS	DESCRIPTION
B.3.4.1	REAERATION PARAMETERS
B.3.4.2	REACTION RATES BY JUNCTIONS
B.3.4.3	REACTION RATES BY MILES
B.3.4.4	WIND VARIABILITY
B.3.4.5	AVERAGE WIND SPEEDS BY JUNCTIONS
B.3.4.6	AVERAGE WIND SPEEDS BY MILES
B.3.4.7	WIND FACTOR VARIABILITY
B.3.4.8	WIND EFFECT MULTIPLICATION FACTORS BY JUNCTIONS
B.3.4.9	WIND EFFECT MULTIPLICATION FACTORS BY MILES
B.3.4.10	CONSTANT WIND EFFECT FACTORS
B.3.4.11	SEDIMENT OXYGEN DEMAND VARIABILITY
B.3.4.12	SEDIMENT OXYGEN DEMAND RATES BY JUNCTIONS
B.3.4.13	SEDIMENT OXYGEN DEMAND RATES BY MILES
B.3.4.14	SEDIMENT OXYGEN DEMAND FACTORS
B.3.4.15	PHOTOSYNTHESIS AND RESPIRATION RATE VARIABILITY
B.3.4.16	PHOTOSYNTHESIS RATES BY JUNCTIONS
B.3.4.17	PHOTOSYNTHESIS RATES BY MILES
B.3.4.18	RESPIRATION RATES BY JUNCTIONS
B.3.4.19	RESPIRATION RATES BY MILES
B.3.4.20	ALGAL VARIABILITY
B.3.4.21	ALGAL CONCENTRATIONS BY JUNCTIONS
B.3.4.23	EUPHOTIC DEPTH VARIABILITY
B.3.4.24	EUPHOTIC DEPTHS BY JUNCTION
B.3.4.25	EUPHOTIC DEPTHS BY MILES

CARDS	COLUMNS	VARIABLE NAME	DESCRIPTION

VARIABLES IN CARD GROUP II

II.			SECTION HEADER
	1-80	ALPHA(I)	Alphanumeric identifier for section. Printed as section heading in output (I=1,20).
A.1			SUBSECTION HEADER
	1-80	HEADER	Alphanumeric identifier for subsection of card deck.
A.2			BASIC CONSTITUENT HANDLING
	1-45	-	Comments
	46-50	NUMCON	Number of quality constituents, up to five. If NUMCON=0, the standard DO Budget default parameters are set up, and NUMCON is set equal to 5.
	51-55	NOPT	Parameter controlling the duplication of the initial concentrations and constant input loads for certain constituents. NOPT=0 : No duplication NOPT=1 : Constituents 2-NUMCON = 1 NOPT=2 : Constituents 3-NUMCON = 2 NOPT=3 : Constituents 4-NUMCON = 3 NOPT=4 : Constituents 5 = 4 NOPT=5 : Constituents 3,4 = 5 NOPT=6 : Constituents 1-NUMCON = 4
	56-60	NSSAT	Flag controlling supersaturation. If NSSAT = 1, supersaturation is allowed; if NSSAT=2, supersaturation is prevented.
	61-65	NITROP	Parameter controlling nitrification options:

CARDS	COLUMNS	VARIABLE NAME	DESCRIPTION

NITROP	OPTION
0	Read in nitrification rates and pattern.
1	Standard nitrification rates and pattern.
2	Standard nitrification pattern read in rates.
3	High nitrification rates in standard pattern.

A.3 CONSTITUENT IDENTIFICATION

	1-80	ALPHA(I)	Alphanumeric identifier, one card for each constituent (I=121-NALPHA, where NALPHA = NUMCON * 20). These are printed in output table headings, centered on page if centered on card.

Card A.3 is repeated NUMCON times.

A.4 CONSTITUENT INFORMATION

1-5	NCONS(1)	Flags specifying whether constituent K decays. If NCONS(K) = 0, constituent K is conservative; if NCONS(K) > 0, constituent K decays.
6-10	NCONS(2)	
11-15	NCONS(3)	
16-20	NCONS(4)	
21-25	NCONS(5)	
26-30	NCHLO	Constituent number for algae(if needed).
31-35	NAMM	Constituent number for ammonia(if needed).
36-40	NPHO	Constituent number for phosphorus(if needed).
41-45	NAD1	Constituent number to which additional decay rate 1 applies.
46-50	NAD2	Constituent number to which additional decay rate 2 applies.
51-55	NDO	Constituent number for DO (if needed).
56-60	NNO3	Constituent number for nitrate (if needed).

CARDS	COLUMNS	VARIABLE NAME	DESCRIPTION
			Card A.4 is deleted if NUMCON = 0
A.5			CONSTITUENT LINKAGE
	1-5	CO(1,K)	Constituent coefficient for the transfer of mass from constituent I (first subscript) to constituent K. When x mg/l of constituent I decays, x * CO(I,K) mg/l is added to constituent K.
	6-10	CO(2,K)	
	11-15	CO(3,K)	
	16-20	CO(4,K)	
	21-25	CO(5,K)	
			Card A.5 is repeated NUMCON times. If NUMCON = 0, card A.5 is deleted.
A.6			FUNCTION OPERATORS
		FUNC(I,K)	Coefficient linking various process functions (I) to constituent K. If FUNC(I,K) not = 0, then constituent K undergoes process I with a conversion coefficient numerically equal to FUNC(I,K).
	1-5	FUNC(1,K)	Reaeration
	6-10	FUNC(2,K)	Sediment oxygen demand
	11-15	FUNC(3,K)	Photosynthesis tied to modeled algae
	16-20	FUNC(4,K)	Respiration tied to modeled algae
	21-25	FUNC(5,K)	Photosynthesis tied to input algal concentration.
	26-30	FUNC(6,K)	Respiration tied to input algal concentration
	31-35	FUNC(7,K)	Second order kenitics (or higher)
	36-40	FUNC(8,K)	Uptake of ammonia by algae
	41-45	FUNC(9,K)	Uptake of Phosphorus by algae
	46-50	FUNC(10,K)	Additional decay 1

CARDS	COLUMNS	VARIABLE NAME	DESCRIPTION
	51-55	FUNC(11,K)	Additional decay 2
	56-60	FUNC(12,K)	Denitrification

Card A.6 is repeated NUMCON times.
If NUMCON = 0, card is deleted

A.7			CONCENTRATION LIMITS
	1-10	CLIMIT(1)	Concentration limit for
	11-20	CLIMIT(2)	Constituent K. Run is aborted
	21-30	CLIMIT(3)	If concentration K exceeds
	31-40	CLIMIT(4)	CLIMIT(K).
	41-50	CLIMIT(5)	

Card A.7 is deleted if NUMCON = 0

A.8			WATER TEMPERATURE
	1-45	-	Comments
	46-50	NTCYC1	First quality time cycle for which current water temperature applies.
	51-55	NTCYC2	Last quality time cycle for which current water temperature applies. After this cycle, new temperature and DO budget information are read in.
	56-60	TEMP	Current water temperature, degrees C.
B.1			SUBSECTION HEADER
	1-80	HEADER	Alphanumeric identifier for subsection of of card deck.

The following set of cards (from B.2 to the end of section II) is read NUMCON times (K = 1,2,...,NUMCON)

CARDS	COLUMNS	VARIABLE NAME	DESCRIPTION
B.2			CONSTITUENT K REACTION VARIABILITY
	1-45	-	Comments
	46-50	ND	The number of discrete reaches in which different reaction rates apply for constituents K. If ND = 0, then default reaction rates will be set. (1)
	51-55	THETA(K)	Temperature correction factor for constituent K. Reaction rates are input for 20 C, then corrected to ambient water temperature by the formula, RATE(T) = RATE(20) * THETA ** (TEMP - 20).

If NCONS(K) = 0, the following cards are skipped. If ND > 0, then cards from REACTION TRACK 1 are read (B.3.n.m); if ND = 0, cards from REACTION TRACK 2 are read (B.4.n.m).

The following cards comprise REACTION TRACK 1: STANDARD INPUT

B.3.1.1			CONSTITUENT K REACTION RATES BY JUNCTIONS
	1-10	NJF	First junction in reach for which reaction rate DECAY applies.
	11-20	NJL	Last junction in reach for which reaction rate DECAY applies.
	21-30	DECAY	Decay rate (20 C) for constituent K in all junctions between NJF and NJL.

If ND on Card B.2 is between 1 and 30, Card B.3.1.1 is read ND times. If ND is greater than 100, Card

CARDS	COLUMNS	VARIABLE NAME	DESCRIPTION
			B.3.1.1 is deleted.
B.3.1.2			CONSTITUENT K REACTION RATES BY MILES
	1-10	RM(I)	First river mile at which reaction rate RXN(I) applies.
	11-20	RM(II)	Last river mile at which reaction rate RXN(I) applies.
	21-30	RXN(I)	Decay rate (20 C) for constituent K in all junctions between RM(I) and RM(II).
			If ND on Card B.2 is between 101 and 130, Card B.3.1.2 is read ND - 100 times. If ND is less than 100, Card B.3.1.2 is deleted.
			If NAD1 (Card A.4) equals K (the current constituent number), then cards B.3.2.1 and either B.3.2.2 or B.3.2.3 are read. If NAD1 does not equal K, then these cards are deleted.
B.3.2.1			ADDITIONAL REACTION 1: VARIABILITY
	1-45	-	Comments
	46-50	ND	The number of discrete reaches in which different reaction rates apply for additional reaction 1. (1)
			If ND = 0, then default reaction rates will be set.
	51-60	THETA(6)	Temperature correction factor for additional reaction 1. (2)
			If ND = 0, then Cards B.3.2.2 and B.3.2.3 are deleted. If ND is between 1 and 30, then Card B.3.2.2 is read ND times and Card B.3.2.3 is deleted. If ND is between 101 and 130, then Card B.3.2.2 is deleted and Card B.3.2.3 is read ND - 100 times.
B.3.2.2			ADDITIONAL REACTION 1: RATES BY JUNCTION
	1-10	NJF	First junction in reach for which reaction rate DECAY applies.
	11-20	NJL	Last junction in reach for which reaction rate DECAY applies.

CARDS	COLUMNS	VARIABLE NAME	DESCRIPTION
	21-30	DECAY	Decay rate (20 C) for junctions between NJF and NJL
B.3.2.3			ADDITIONAL REACTION 1: RATES BY MILES
	1-10	RM(I)	First river mile at which reaction rate RXN(I) applies.
	11-20	RM(II)	Last river mile at which reaction rate RXN(I) applies.
	21-30	RXN(I)	Decay rate (20 C) for all junctions between RM(I) and RM(II).

If NAD2 (card A.4) equals K (the current constituent number), then cards B.3.3.1 and either B.3.3.2 or B.3.3.3 are read. If NAD2 does not equal K, then these cards are deleted.

B.3.3.1			ADDITIONAL REACTION 2: VARIABILITY
	1-45	-	Comments
	46-50	ND	The number of discrete reaches in which different reaction rates apply for additional reaction 2. If ND = 0, then default rates for organic nitrogen decay will be set.(1)
	51-55	THETA(7)	Temperature correction factor for additional reaction 2 (2).

If ND = 0, then Cards B.3.3.2 and B.3.3.3 are deleted. If ND is between 1 and 30, then Card B.3.3.2 is read ND times. If ND is between 101 and 130, then Card B.3.3.3 is read ND - 100 times.

B.3.3.2			ADDITIONAL REACTION 2: RATES BY JUNCTIONS
			SAME AS B.3.2.2

CARDS	COLUMNS	VARIABLE NAME	DESCRIPTION
B.3.3.3			ADDITIONAL REACTION 2: RATES BY MILES
			SAME AS B.3.2.3
			If NDO (card A.4) equals K (the current constituent number), then Cards B.3.4.m are read. If NDO does not equal K, then these cards are deleted.
B.3.4.1			REAERATION PARAMETERS
	1-45	-	Comments
	46-50	ND	The number of discrete reaches in which different reaeration rates apply.(1) This number is used only if IREOXK = 3, signifying a constant reaeration rate. If ND = 0 (and IREOX = 3) then the constant reaeration rates are calculated using tidally averaged depth and current velocity in the O'Connor Dobbins formula.
	51-55	IREOXK	Reaeration option. For IREOXK = 0,1 or 2, the reaeration rate is computed each quality time step using the O'Connor-Dobbins, the CHurchill,or the USGS formula. For IREOXK = 3, the reaeration rates are time constant and either read in (for ND > 0) or calculated internally (for ND = 0). The temperature correction factor for reaeration is THETA(NDO)(i.e., the THETA read in on card B.2 for constituent K = NDO)
			If IREOXK does not = 3, or if ND = 0, then Cards B.3.4.2 and B.3.4.3 are deleted. If IREOXK = 3 and ND is between 1 and 30, then Card B.3.4.2 is read ND times; if ND is between 101 and 130, then Card B.3.4.3 is read ND - 100 times.
B.3.4.2			REACTION RATES BY JUNCTIONS
			SAME AS B.3.2.2
B.3.4.3			REACTION RATES BY MILES

CARDS	COLUMNS	VARIABLE NAME	DESCRIPTION
			SAME AS B.3.2.3
B.3.4.4			WIND VARIABILITY
	1-45	-	Comments
	46-50	ND	The number of discrete reaches in which different wind speeds apply. (1) If ND = 0 then zero wind speed is assumed.

If ND = 0, then Cards B.3.4.5, B.3.4.6, B.3.4.7, B.3.4.8 B.3.4.9, and B.3.4.10 are deleted. If ND is between 1 and 30, then Card B.3.4.5 is read ND times. If nd is between 101 and 130, then Card B.3.4.6 is read ND-100 times.

B.3.4.5			AVERAGE WIND SPEEDS BY JUNCTIONS
			SAME AS B.3.2.2
B.3.4.6			AVERAGE WIND SPEEDS BY MILES
			SAME AS B.3.2.3
B.3.4.7			WIND FACTOR VARIABILITY
	1-45	-	Comments
	46-50	ND	The number of discrete reaches in which different wind effect multiplication factors apply.(1) If ND = 0, then a multiplication factor of unity is assumed. These factors augment or diminsh the effects of wind speed on reaeration based on wind direction, channel configuration, and river bredth.

If ND = 0, then cards B.3.4.8, B.3.4.9, and B.3.4.10 are deleted. If ND is between 1 and 30, then Card B.3.4.8 is read ND times. If ND is between 101 and 130, then Card B.3.4.9 is read ND - 100 times.

B.3.4.8			WIND EFFECT MULTIPLICATION FACTORS BY JUNCTIONS

CARDS	COLUMNS	VARIABLE NAME	DESCRIPTION
			SAME AS B.3.2.2
B.3.4.9			WIND EFFECT MULTIPLICATION FACTORS BY MILES
			SAME AS B.3.2.3
B.3.4.10			CONSTANT WIND EFFECT FACTORS
	1-45	-	Comments
	46-50	WINDF	Factor relating wind speed to extra reaeration. For every mph of wind speed above WINDB mph, the reaeration coefficient is increased by 1/day.
	51-55	WINDB	The point at which wind speed begins influencing reaeration. Wind speeds below WINDB mph are assumed to have no effect on reaeration. Wind speeds above WINDB increase reaeration by WINDF * (wind speed - WINDB) 1/day.
B.3.4.11			SEDIMENT OXYGEN DEMAND VARIABILITY
	1-45	-	Comments
	46-50	ND	The number of discrete reaches in which different sediment oxygen demand rates apply.(1) If ND = 0, then default rates and factors apply.

If ND = 0, then Cards B.3.4.12, B.3.4.13,.and B.3.4.14 are deleted. If ND is between 1 and 30 then Card B.3.4.12 is read ND times.
If ND is between 101 and 130, then Card B.3.4.13 is read ND - 100 times.

B.3.4.12			SEDIMENT OXYGEN DEMAND RATES BY JUNCTIONS
			SAME AS B.3.2.2
B.3.4.13			SEDIMENT OXYGEN DEMAND RATES BY MILES

CARDS	COLUMNS	VARIABLE NAME	DESCRIPTION
			SAME AS B.3.2.3
B.3.4.14			SEDIMENT OXYGEN DEMAND FACTORS
	1-45	-	Comments
	46-50	THETA(10)	Temperature correction factor for sediment oxygen demand.(2)
	51-55	SODBR	The concentration of dissolved oxygen above which SOD is not affected by DO. Below SODBR mg/l, SOD(DO) = SOD * (DO/SODBR) ** SODEXP.
	56-60	SODEXP	The exponential factor relating effective SOD to DO levels below SODBR mg/l.
B.3.4.15			PHOTOSYNTHESIS AND RESPIRATION RATE VARIABILITY.
	1-45	-	Comments
	46-50	ND	The number of discrete reaches in which different photosynthesis and respiration rates apply. (1) If ND = 0, then default rates and factors apply.
	51-55	THET	temperature correction factor for photosynthesis and respiration, used only if ND > 0. (2)

If ND = 0, then Cards B.3.4.16, B.3.4.17, B.3.4.18, and B.3.4.19 are deleted. If ND is between 1 and 30, then Cards B.3.4.16.is read ND times, and Card B.3.4.18 is read ND times. If ND is between 101 and 130, then Card B.3.4.17 is read ND - 100 times and Card B.3.4.19 is read ND - 100 times.

B.3.4.16			PHOTOSYNTHESIS RATES BY JUNCTIONS
			SAME AS B.3.2.2

CARDS	COLUMNS	VARIABLE NAME	DESCRIPTION
B.3.4.17			PHOTOSYNTHESIS RATES BY MILES
			SAME AS B.3.2.3
B.3.4.18			RESPIRATION RATES BY JUNCTIONS
			SAME AS B.3.2.2
B.3.4.19			RESPIRATION RATES BY MILES
			SAME AS B.3.2.3
B B.3.4.20			ALGAL VARIABILITY
	1-45	-	Comments
	46-50	ND	The number of discrete reaches in which different algal concentrations apply. (1) If ND = 0, then a default background concentration of 25 ug/l chlorophyll a applies.
			If ND = 0, then Cards B.3.4.21 and B.3.4.22 are deleted. If ND is between 1 and 30, then Card B.3.4.21 is read ND times. If ND is between 101 and 130, then Card B.3.4.22 is read ND - 100 times.
B.3.4.21			ALGAL CONCENTRATIONS BY JUNCTIONS
			SAME AS B.3.2.2
B.3 4 22			ALGAL CONCENTRATIONS BY MILES
			SAME AS B.3.2.3
B.3.4.23			EUPHOTIC DEPTH VARIABILITY
	1-45	-	Comments
	46-50	ND	The number of discrete reaches in which different euphotic depths apply. (1) If ND = 0, then default depths are set based on NDP.
	51-55	NDP	Flag setting default euphotic depths. If NDP = 0, average euphotic depths

CARDS	COLUMNS	VARIABLE NAME	DESCRIPTION
			are used. If NDP = 1, smaller euphotic depths are used.
			If ND = 0, then Cards B.3.4.24 and B.3.4.25 are deleted. If ND is between 1 and 30, then Card B.3.4.24 is read ND times. If ND is between 101 and 130, then Card B.3.4.25 is read ND - 100 times.
B.3.4.24			EUPHOTIC DEPTHS BY JUNCTION
			SAME AS B.3.2.2
B.3.4.25			EUPHOTIC DEPTHS BY MILES
			SAME AS B.3.2.3
B.3.5			HIGHER ORDER REACTION KINETICS
	1-45	-	Comments
	46-50	RORDER(K)	Reaction order for constituent K (if above 1).
			If FUNC(7,K) = 0, then Card B.3.5 is deleted
B.3.6			DENITRIFICATION PARAMETERS
	1-45	-	Comments
	46-50	DNMAX	The maximum denitrification rate at 20 C, achieved when the DO concentration is zero.
	51-55	DNBRK	The denitrification rate at 20 C, achieved when the DO concentration is DNDOBR mg/l
	56-60	DNDOBR	The DO concentration below which the denitrification rate increases rapidly as a function of DO. At DNDOBR mg/l and 20 C, the denitrification rate is DNBRK 1/day.
	61-65	DNSTRT	The DO concentration at which denitrification begins. When DO is above DNSTRT, the denitrification

CARDS	COLUMNS	VARIABLE NAME	DESCRIPTION
			rate is zero.
	-	-	For DO concentrations between DNSTRT and DNDOBR, the denitrification rate increases linearly from 0 to DNBRK. For DO concentrations between DNDOBR and 0, the denitrification rate increases linearly from DNBRK to DNMAX.
	66-70	THETDN	Temperature correction factor for denitrification. (2)

The following cards comprise REACTION TRACK 2: DEFAULT INPUT

If K (the current constituent number) equals 1, then Cards B.4.1.n are read and all others are deleted. If K = 2, then Card B.4.2 is read and all others are deleted. If K equals 4, then Card B.4.3.n are read and all others are deleted. If K = 5, then Cards B.4.4.n are read and all others are deleted.

B.4.1.1			ORGANIC NITROGEN SETTLING VARIABILITY
	1-45	-	Comments
	46-50	ND	The number of discrete reaches in which different organic nitrogen settling rates apply. (1) If ND = 0, then default setting rates are set.
	51-55	THETA(7)	Temperature correction factor for organic nitrogen settling, used only if ND = 0. (2)

If ND = 0, then Cards B.4.1.2 and B.4.1.3 are deleted. If ND is between 1 and 30, then card B.4.1.2 is read ND times. If ND is between 101 and 130, then Card B.4.1.3 is read ND - 100 times.

CARDS	COLUMNS	VARIABLE NAME	DESCRIPTION
B.4.1.2			ORGANIC NITROGEN SETTLING RATES BY JUNCTIONS SAME AS B.3.2.2
B.4.1.3			ORGANIC NITROGEN SETTLING RATES BY MILES SAME AS B.3.2.2
			If NITROP (Card A.2) equals 2, then Card B.4.2 is read. If NITROP does not equal 2, then Card B.4.2 is deleted.
B.4.2			NITRIFICATION RATES FOR STANDARD PATTERN
	1-45	-	Comments
	-	-	The following are nitrification rates applied to general reaches of the estuary (some reach lengths vary with temperature).
	46-50	RNIT(1)	Rate for tidal tributaries and upper estuary between Trenton and Fieldsboro.
	51-55	RNIT(2)	Rate for growth zone between Fieldsboro and Bristol.
	56-60	RNIT(3)	Rate for uninhibited nitrification zone from Bristol to Philadelphia
	61-65	RNIT(4)	Rate for inhibited zone at Philadelphia.
	66-70	RNIT(5)	Rate for regrowth zone just below Philadelphia.
	71-75	RNIT(6)	Rate for maximum nitrification zone, generally between Chester and Wilmington.
	76-80	RNIT(7)	Rate for mature nitrification zone, generally at or below Wilmington.

CARDS	COLUMNS	VARIABLE NAME	DESCRIPTION
B.4.3.1			CBOD SETTLING VARIABILITY
	1-45	-	Comments
	46-50	ND	The number of discrete reaches in which different CBOD settling rates apply. (1) If ND = 0, then default setting rates are set.
	51-55	THETA(6)	Temperature correction factor for CBOD settling, used only if ND = 0. (2)

If ND = 0, then Cards B.4.3.2 and B.4.3.3 are deleted. If ND is between 1 and 30, then Card B.4.3.2 is read ND times. If ND is between 101 and 130, then Card B.4.3.3 is read ND - 100 times.

B.4.3.2 CBOD SETTLING RATES BY JUNCTIONS

SAME AS B.3.2.2

B.4.3.3 CBOD SETTLING RATES BY MILES

SAME AS B.3.2.3

(B.4.4.n) (DO BUDGET CARDS)

Cards B.4.4.n (n = 1 - 25) are the same as Cards B.3.4.m.

(1.) For ND between 1 and 30, reaches are defined by junction numbers. For ND between 101 and 130, reaches are defined by river miles, and the number of reaches = ND - 100.

(2.) Reaction rates are input for 20 C, then corrected to ambient water temperature by the formula, RATE(T) = RATE(20) * THETA ** (TEMP - 20).

4.4 CARD GROUP III
WASTEWATER AND TRIBUTARY LOADS

TABLE 4-5
CARDS IN GROUP III

CARDS	DESCRIPTION
III.	SECTION HEADER
A.1	SUBSECTION HEADER
A.2	WASTEWATER ADJUSTMENT FACTORS BY JUNCTIONS
A.3	WASTEWATER ADJUSTMENT FACTORS BY MILES
B.1	SUBSECTION HEADER
B.2	TOTAL JUNCTION DISCHARGE
B.3	INDIVIDUAL DISCHARGES
B.4	UPSTREAM JUNCTION
B.5	UPSTREAM FRESH WATER INFLOW
C.1	SUBSECTION HEADER
C.2	VARIABLE DISCHARGE DESCRIPTION
C.3	VARIABLE DISCHARGE INFORMATION

CARDS	COLUMNS	VARIABLE NAME	DESCRIPTION

VARIABLES IN CARD GROUP III

III.			SECTION HEADER
	1-80	ALPHA(I)	Alphanumeric identifier for section printed as section heading in output. (I = 1-20)
A.1			SUBSECTION HEADER
	1-80	HEADER	Alphanumeric identifier for subsection of card deck.

If MGROUP(1) through MGROUP(NUMCON) on card I.C.6 are all 0, then the rest of the cards in group III.A are deleted. If MGROUP(I) is between 1 and 30, then Card III.A.2 is read MGROUP(I)/5 times (fractions are rounded up to the next whole number). If MGROUP(I) is between 101 and 130, then Card III.A.3 is read (MGROUP(I) - 100)/5 times (fractions rounded up). Cards III.A.2 or 3 are read in order by constituent number I.

A.2			WASTEWATER ADJUSTMENT FACTORS BY JUNCTIONS
	1-5	FACTR(I,K)	Multiplication factor to adjust concentrations of constituent I in discharges of group K - between junction NJSTRT(I,K) and NJSTOP(I,K); those types of discharges for which LGROUP(type) = 0 (card I.C.5) are not adjusted. K = 1, 6, 11, 16, 21, or 26.
	6-10	NJSTPT(I,K)	The lowest junction number in the sequence of junctions comprising group K for constituent I. K = 1,6,11,16,21,or 26.
	11-15	NJSTOP(I,K)	The highest junction number in the sequence of junction comprising group K for constituent I. K = 1,6,11,...,26.
	16-20	FACTR(I,K+1)	
	21-25	NJSTRT(I,K+1)	Group K+1
	26-30	NJSTOP(I,K+1)	

CARDS	COLUMNS	VARIABLE NAME	DESCRIPTION
	31-35	FACTR(I,K+2)	
	36-40	NJSTRT(I,K+2)	Group K+2
	41-45	NJSTOP(I,K+2)	
	46-50	FACTR(I,K+3)	
	51-55	NJSTRT(I,K+3)	Group K+3
	56-60	NJSTOP(I,K+3)	
	61-65	FACTR(I,K+4)	
	66-70	NJSTRT(1,K+4)	Group K+4
	71-75	NJSTOP(I,K+4)	
A.3			WASTE WATER ADJUSTMENT FACTOR BY MILES
	1-5	FACTR(I,K)	Multiplication factor to adjust concentrations of constituent I in discharges of group K between those types of discharges for which LGROUP(type) = 0 (card I.C.5) are not adjusted. K = 1,6,11,16,21,or,26.
	6-10	RMSTRT(I,K)	The lowest river mile in the sequence of river miles comprising group K for constituent I. K = 1,6,11,16,21,or,26.
	11-15	RMSTOP(I,K)	The highest river mile in the sequence of river miles comprising group K for constituent I. K = 1,6,11,16,21,or,26.
	16-20	FACTR(I,K+1)	
	21-25	RMSTRT(I,K+1)	Group K+1
	26-30	RMSTOP(I,K+1)	
	31-35	FACTR(I,K+2)	
	36-40	RMSTRT(I,K+2)	Group K+2
	41-45	RMSTOP(I,K+2)	
	46-50	FACTR(I,K+3)	
	51-55	RMSTRT(I,K+3)	Group K+3
	56-60	RMSTOP(I,K+3)	
	61-65	FACTR(I,K+4)	
	66-70	RMSTRT(I,K+4)	Group K+4
	71-75	RMSTOP(I,K+4)	
B.1			SUBSECTION HEADER

CARDS	COLUMNS	VARIABLE NAME	DESCRIPTION
	1-80	HEADER	Alphanumeric identifier for subsection of card deck.
B.2			TOTAL JUNCTION DISCHARGE
	1-5	JJ	Junction number for discharges.
	6-10	ND	Number of discharges entering junction JJ.
	11-15	NZ	River zone in which JJ is located.

If JJ is greater than zero, then Card B.3 is read ND times, once for each individual dishcarge (subscript K). If JJ equals zero then Card B.3 is deleted and the program moves on to Card B.4.

For restart runs where KZOP (Card I.C.2) equals 1, Card B.2 is read once with JJ equal to zero. Card B.3 is deleted.

B.3			INDIVIDUAL DISCHARGES
	1-1	NTYPE	Type of discharge: 1 = municipal, 2 = industrial, 3 = tributary, 4 = storm water runnoff.
	3-10	ALPHA(I)	Name of discharge to be printed on table. I = 1,2.
	12-15	ALPHA(3)	Type of discharge to be printed in table (MUN,IND,etc).
	16-20	CRF(6)	Correction factor for input flow. If input flow is in MGD, for example, CRF(6) should be 1.55 to convert it to CFS. For no correction, CRF(6) = 1.0
	21-25	CRF(1)	Correction factors for input concentrations
	26-30	CRF(2)	for constituents 1-5. If input concentration
	31-35	CRF(3)	for constituent 4 is BOD5, for example,
	36-40	CRF(4)	crf(4) might be 1.45 to convert it to CBOD.
	41-45	CRF(5)	For no correction, CRF(I) = 1.0.
	46-55	WFLO(1,K)	Input flow for discharge K. If not in CFS, then CRF(6) must be specified so that the

CARDS	COLUMNS	VARIABLE NAME	DESCRIPTION
			product of CRF(6) and WFLO(1,K) is in CFS.
	56-60	WCON(1,K)	Input concentrations for constituents I(1-5)
	61-65	WCON(2,K)	in discharge K. These are multiplied by
	66-70	WCON(3,K)	CRF(I) to produce the actual concentration
	71-75	WCON(4,K)	used in the model.
	76-80	WCON(5,K)	

Card B.2 along with a set of Cards B.3 are read for each node containing discharges. No particular order is required. When all discharges are read, then a final card B.2 is read with JJ = 0.

B.4			UPSTREAM JUNCTION
	1-5	JJ	Junction number for upstream fresh water input to estuary.
	6-10	ND	Number of upstream freshwater inputs, equals 1.
	11-15	NZ	River zone designation for upstream fresh water input, equals 1.

If JJ is greater than zero, then Card B.5 is read. If JJ equals zero, then Card B.5 is deleted and the program moves on to card C.1.

For restart runs where KZOP (Card I.C.2) equals 1, Card B.4 is read once with JJ equal to zero. Card B.5 is deleted.

B.5			UPSTREAM FRESH WATER INFLOW
			SAME AS CARD B.3

Cards B.4 and B.5 provide average information concerning the upstream freshwater inflow into the estuary. This information is included in the discharge summary table, but not by the model during the simulation. The actual upstream

CARDS	COLUMNS	VARIABLE NAME	DESCRIPTION
			conditions used are input in Section 4. Following cards B.4 and B.5, Card B.4 is read in again, with JJ = 0.
C.1			SUBSECTION HEADER
	1-80	HEADER	Alphanumeric identifier for subsection of card deck.
			If NJVDIS = 0 (card I.C.7), then the remaining cards in this section are deleted. If NJVDIS > 0, then the remaining set of cards is read NJVDIS times, once for each different varying discharge (subscripted J).
C.2			VARIABLE DISCHARGE DESCRIPTION
	3-10	ALPHA(I)	Name of discharge to be printed in table. I = 1,2.
	12-15	ALPHA(3)	Type of discharge to be printed in table.
	16-20	CRF(6)	Correction factor for input flow. This is multiplied by the input flows to give the actual flows used by the model. For no correction, CRF(6) = 1.0.
	21-25	CRF(1)	Correction factors for input concentrations.
	26-30	CRF(2)	CRF(I) is multiplied by the input
	31-35	CRF(3)	concentrations to give the actual
	36-40	CRF(4)	concentrations used by the model.
	41-45	CRF(5)	For no correction, CRF(I) = 1.0.
	46-50	NJVD(J)	The junction number at which varying discharge J is located.
	51-55	NINCF(J)	The number of discrete increments assumed by discharge J as it varies.
	56-60	NPERF(J)	The period of discharge J, in quality cycles, to be printed in table. For a non-periodic discharge, NPERF(J) is set equal to a large number.
	61-65	NTYS(J)	Type of discharge J: 1 = municipal, 2 = industrial, 3 = tributary,

CARDS	COLUMNS	VARIABLE NAME	DESCRIPTION
			4 = storm water runoff.
	66-70	NZSN(J)	River zone in which discharge J is located.
			Card C.3 is read NINCF(J) times, once for each discrete increment (subscribed K).
C.3			VARIABLE DISCHARGE INFORMATION
	1-10	INCF(J,K)	The length of increment K, in quality cycles.
	21-30	FLO(J,K)	The input flow for discharge J during increment K. This is multiplied by CRF(6) (card C.2) to give the actual flow used by the model
	31-40	CON(1,J,K)	Input concentrations for discharge J during increment K. These are multiplied by CRF(I) (Card C.2) to give the actual concentrations used by the model.
	41-50	CON(2,J,K)	
	51-60	CON(3,J,K)	
	61-70	CON(4,J,K)	
	71-80	CON(5,J,K)	

4.5 CARD GROUP IV
WATER QUALITY BOUNDARY CONDITIONS

TABLE 4-6
CARDS IN GROUP IV

CARDS	DESCRIPTION
IV.	SECTION HEADER
A.	BOUNDARY CONDITION CONTROL
B.	BOUNDARY CONCENTRATIONS AT JUNCTION 1
C.	BOUNDARY CONCENTRATIONS AT JUNCTION 2
D.	BOUNDARY LOAD AT UPSTREAM JUNCTION

CARDS	COLUMNS	VARIABLE NAME	DESCRIPTION

VARIABLES IN CARD GROUP IV

IV.			SECTION HEADER
	1-80	ALPHA(I)	Alphanumeric identifier for section. Printes as section heading in output. (I = 1 - 20)
A.			BOUNDARY CONDITION CONTROL
	3-10	ALPHA(I)	Name of upstream boundary, here DELAWARE. (I=1,2)
	12-15	ALPHA(3)	Type of upstream boundary, here RIVER
	16-20	CRF(6)	Correction factor for input flow (upstream boundary). This is multiplied by the input flow to give the actual flow used by the model. For no correction. CRF(6) = 1.0.
	21-25 26-30 31-35 36-40 41-45	CRF(1) CRF(2) CRF(3) CRF(4) CRF(5)	Correction factors for input concentrations of both upstream and seaward boundaries. CRF(I) is multiplied by the input concentrations to give the actual concentrations used by the model. For no correction, CRF(I) = 0.
	46-50	NSPEC	The number of quality time steps per tidal cycle.
	51-55	IVBC1	The number of discrete increments assumed by the concentration at boundary node 1 as it varies throughout the model run.
	56-60	IVBC2	The number of disrete increments assumed by the concentration at boundary node 2 as it varies throughout the model run.
	61-65	IVBC3	The number of discrete increments assumed by the concentration at the upstream boundary as it varies throughout the model run.

Card B. is read IVBC1 times (subscript I)

CARDS	COLUMNS	VARIABLE NAME	DESCRIPTION
B.			BOUNDARY CONCENTRATIONS AT JUNCTION 1
	46-50	INCBC1(I)	The length of increment I, in quality cycles, during which the concentration of junction 1 is set at VBC1(I,K), where K = 1,5.
	51-55	VBC1(I,1)	The concentrations of constituents 1-5 at junction 1 during increment I. These are multiplied by CRF(K) to give the actual concentrations used by the model (K = 1-5).
	56-60	VBC1(I,2)	
	61-65	VBC1(I,3)	
	66-70	VBC1(I,4)	
	71-75	VBC1(I,5)	
		Card C. is read IVBC2 times (subscript I).	
C.			BOUNDARY CONCENTRATIONS AT JUNCTION 2
	1-45	-	Comments
	46-50	INCBC2(I)	The length of increment I, in quality cycles, during which the high slack concentrations of junction 2 are set at VBC2(I,K), where K = 1-5.
	51-55	VBC2(I,1)	The high slack concentration of constituents 1-5 at junction 2 during increment I. These are multiplied by CRF(K) to give the actual concentrations used by the model. (K = 1-5)
	56-60	VBC2(I,2)	
	61-65	VBC2(I,3)	
	66-70	VBC2(I,4)	
	71-75	VBC2(I,5)	
		Card D. is read IVBC3 times (subscripted K)	
D.			BOUNDARY LOAD AT UPSTREAM JUNCTION
	1-45	-	Comments
	46-50	INCF(J,K)	The length of increment K, in quality cycles during which the freshwater flow and concentrations at the upstream junction are set at FLO(J,K) and CON(I,J,K), where I = 1-5. J is set internally.

CARDS	COLUMNS	VARIABLE NAME	DESCRIPTION
	51-55	FLO(J,K)	The freshwater inflow at the upstream junction during increment K. This is multiplied by CRF(6) to give the actual flow used by the model.
	56-60	CON(1,J,K)	The concentrations of constituents 1-5 in the freshwater inflow at the upstream junction. These are multiplied by CRF(I) to give the actual concentrations used by the model (I = 1 - 5).
	61-65	CON(2,J,K)	
	66-70	CON(3,J,K)	
	71-75	CON(4,J,K)	
	76-80	CON(5,J,K)	

4.6 CARD GROUP V
INITIAL WATER QUALITY CONDITIONS

TABLE 4-7
CARDS IN GROUP V

CARDS	DESCRIPTION
V.	SECTION HEADER
A.1	INITIAL CONDITIONS
A.2	INITIAL CONDITIONS
B.1	SUBSECTION HEADER
B.2	CONCENTRATION ADJUSTMENT FACTORS BY JUNCTIONS
B.3	CONCENTRATION ADJUSTMENT FACTORS BY MILES

CARDS	COLUMNS	VARIABLE NAME	DESCRIPTION

VARIABLES IN CARD GROUP V

V.			SECTION HEADER
	1-80	ALPHA(I)	Alphanumeric identifier for section. Printed as section heading in output. (I = 1 - 20)
			If KZOP (on card I.C.2) equals zero, then initial conditions are read in section A below. If KZOP is greater than zero, then initial conditions are read from a restart file and section A is deleted.
A.1			INITIAL CONDITIONS
	1-5	JJ	Junction number. Read as dummy variable to check card sequence.
	6-15	C(1,1)	Initial concentration assigned to junction 1 for constituents 1 through 5.
	16-25	C(1,2)	
	26-35	C(1,3)	
	36-45	C(1,4)	
	46-55	C(1,5)	
			If JJ equals NJ (on card I.B.2), then C(J,I) is set equal to C(1,I) for J = 2 - NJ and I = 1 - 5; Card A.2 is deleted. If JJ equals 1, then Card A.2 is read NJ - 1 times (corresponding to junction 2 through NJ).
A.2			INITIAL CONDITIONS
	1.5	J	Junction number. Read as dummy variable JJ to check card sequence.
	6-15	C(J,1)	Initial concentration assigned to junction J for constituents 1 through 5.
	16-25	C(J,2)	
	26-35	C(J,3)	
	36-45	C(J,4)	
	46-55	C(J,5)	

CARDS	COLUMNS	VARIABLE NAME	DESCRIPTION
B.1			SUBSECTION HEADER
	1-80	HEADER	Alphanumeric identifier for subsection of card deck.

If NGROUP(1) through NGROUP(NUMCON) on card I.C.4 are all 0, then the rest of the cards in this section are deleted. For I equals 1,2,...,NUMCON, any NGROUP(I) greater

than zero will cause additional cards in this section to be read. If NGROUP(I) is between 1 and 30, then Card B.2 is read NGROUP(I)/5 times (fractions are rounded up to the next whole number). If NGROUP(I) is between 101 and 130, then Card B.3 is read (NGROUP(I) - 100)/5 times (fractions rounded up).

B.2			CONCENTRATION ADJUSTMENT FACTORS BY JUNCTIONS
	1-5	FACTR(I,K)	Multiplication factor to adjust initial concentrations of constituent I for group K, comprising junctions between NJSTRT(I,K) and NJSTOP(I,K). K = 1,6,11,16,21 or 26.
	6-10	NJSTRT(I,K)	The lowest junction number in the sequence of junctions comprising group K for constituent I. K = 1,6,11,16,21,or 26.
	11-15	NJSTOP(I,K)	The highest junction number in the of junctions comprising group K for constituent I. K = 1,6,11,16,21,or 26.
	16-20	FACTR(I,K+1)	
	21-25	NJSTRT(I,K+1)	Group K+1
	26-30	NJSTOP(I,K+1)	
	31-35	FACTR(I,K+2)	
	36-40	NJSTRT(I,K+2)	Group K+2
	41-45	NJSTOP(I,K+2)	
	46-50	FACTR(I,K+3)	
	51-55	NJSTRT(I,K+3)	Group K+3
	56-60	NJSTOP(I,K+3)	

CARDS	COLUMNS	VARIABLE NAME	DESCRIPTION
	61-65	FACTR(I,K+4)	
	66-70	NJSTRT(I,K+4)	Group K+4
	71-75	NJSTOP(I,K+4)	
B.3			CONCENTRATION ADJUSTMENT FACTOR BY MILES
	1-5	FACTR(I,K)	Multiplication factor to adjust initial concentrations of constituent I for group K, comprising junctions between river mile RMSTOP(I,K). K = 1,6,11,16,21,or 26.
	6-10	RMSTRT(I,K)	The lowest river mile in the sequence of river miles comprising group K for constituent I. K = 1,6,11,16,21,or26.
	11-15	RMSTRT(I,K)	The highest river mile in the sequence of river miles comprising group K for constituent I. K = 1,6,11,16,21,or 26.
	16-20	FACTR(I,K+1)	
	21-25	RMSTRT(I,K+1)	Group K+1
	26-30	RMSTOP(I,K+1)	
	31-35	FACTR(I,K+2)	
	36-40	RMSTRT(I,K+2)	Group K+2
	41-45	RMSTOP(I,K+2)	
	46-50	FACTR(I,K+3)	
	51-55	RMSTRT(I,K+3)	Group K+3
	56-60	RMSTOP(I,K+3)	
	61-65	FACTR(I,K+4)	
	66-70	RMSTRT(I,K+4)	Group K+4
	71-75	RMSTOP(I,K+4)	

4.7 CARD GROUP VI
~~TRANSPORT FACTORS~~

TABLE 4-8
CARDS IN GROUP VI

CARDS	DESCRIPTION
VI.	SECTION HEADER
A.	CONSTANT TRANSPORT FACTORS
B.1	CARD GROUP HEADER
B.2	VARIABLE ADVECTION FACTORS
B.3	CARD GROUP HEADER
B.4	VARIABLE ADVECTION FACTORS
C.	VARIABLE DISPERSION FACTORS

CARDS	COLUMNS	VARIABLE NAME	DESCRIPTION

VARIABLES IN CARD GROUP VI

VI.			SECTION HEADER
	1-80	ALPHA(I)	Alphanumeric identification for section. Printed as section heading in output. (I = 1-20)
A			CONSTANT TRANSPORT FACTORS
	1-45	-	Comments
	46-50	KADV	Flag specifying whether advective transport factors are constant over the tidal cycle, or vary with flow direction. If KADV = 1, factors are constant over tidal cycle; if KADV = 2 factors vary between ebb and flood tide.
	51-55	CDIFFK	Constant for computing dispersion coefficient in the tidal river not affected by salinity-induced density currents. The dispersion coefficient equals the product of this constant, the local hydraulic radius, and the local ambient current velocity.
	56-60	XCU	Upstream constant advection factor for the tidal river not affected by complex circulation patterns.
	61-65	XCD	Downstream constant advection factor for the tidal river not affected by complex circulation patterns.

CARDS	COLUMNS	VARIABLE NAME	DESCRIPTION
	66-70	XCEBB	Upstream constant advection factor applied during ebb tide if KADV equals 2. This is applied to the tidal river not affected by complex circulation patterns.

If KZOP (Card I.C.2) is greater than 0, then Cards B.1, B.2, B.3, and B.4 are deleted.

B.1			CARD GROUP HEADER
	1-80	HEADER	Alphanumeric identifier for card group.
B.2			VARIABLE ADVECTION FACTORS
	1-5	N	Channel number for which new advection factors apply.
	6-15	YCU	Upstream advection factor applied to channel N.
	16-25	YCD	Downstream advection factor applied to channel N.

Card B.2 is repeated until a value for N greater than 999 is read.

If KADV equals 2, then Cards B.3 and B.4 are read. If KADV does not equal 2, then Cards B.3 and B.4 are deleted, and the program moves to Card C.

B.3			CARD GROUP HEADER
	1-80	HEADER	Alphanumeric identifier for card group.
B.4			VARIABLE ADVECTION FACTORS

CARDS	COLUMNS	VARIABLE NAME	DESCRIPTION
	1-5	N	Channel number for which new ebb tide upstream advection factors apply.
	6-10	YCEBB	Upstream advection factor applied to channel N durring ebb tide if KADV equals 2.
C.			VARIABLE DISPERSION FACTORS
	1-45	-	Comments
	46-50	DIFF1	Constants for computing dispersion coefficients in the salinity influenced region of the estuary. The actual pattern applied is based on the freshwater flow at Trenton. Calibrated values for these five constants are 10.0, 25.0, 50.0, 75.0, 100.0, respectively.
	51-55	DIFF2	
	56-60	DIFF3	
	61-65	DIFF4	
	66-70	DIFF5	

4.8 CARD GROUP VII
TIME VARYING INFORMATION

TABLE 4-9
CARDS IN GROUP VII

CARDS	DESCRIPTION
A.1	NEW TEMPERATURE
A.2.1	NEW NITRIFICATION OPTION
A.2.2	NITRIFICATION RATES FOR STANDARD PATTERN
A.2.3	NITRIFICATION RATES BY MODEL JUNCTION
A.2.4	NITRIFICATION RATES BY RIVER MILE
A.3.N	NEW DISSOLVED OXYGEN BUDGET RAT9ES
B.1	NEW OBSERVED DATA PERIOD
B.2	HEADER FOR TRANSECT POSITION
B.3	NEW OBSERVED DATA

CARDS	COLUMNS	VARIABLE NAME	DESCRIPTION

VARIABLES IN CARD GROUP VII

VII			SECTION HEADER
	1-80	ALPHA(I)	Alphanumeric identifier for section. Printed as section heading in output. (I = 1-20)

This section is repeated once for each half hour of simulated time. Each repetition (or quality cycle) increases the counter ICYC by 1. ICYC begins at the value INCYC (Card I.C.2); when ICYC reaches the value NQCYC (card I.C.2), the simulation ends.

No cards are read during most of these quality cycles. Whenever ICYC exceeds the value NTCYC2 (initialy read on card II.A.8), card group VII.A below is read. Whenever ICYC exceeds the value NDACYC (initialy read on card I.E.2), card group VII.B below is read. Because new values of NTCYC2 and NDACYC are included in card groups VII.A and B, these groups can be read as often as desired.

A.1			NEW TEMPERATURE
	1-45		Comments
	46-50	NTCYC1	First quality time cycle for which new water temperature applies.
	51-55	NTCYC2	Last quality time cycle for which new water temperature applies.
	56-60	TEMP	New water temperature, degrees C.

This subsection corrects all rates to the new temperature. In addition, new rate information is read in for the constituents ammonia and DO when these are included in the simulation.

CARDS	COLUMNS	VARIABLE NAME	DESCRIPTION
			Cards VII.A.2.n describe new ammonia rates, while cards VII.A.3.n describe new DO budget rates. If the constituent number for DO is smaller than the constituent number for ammonia, then the DO cards are placed before the ammonia cards.
A.2.1			NEW NITRIFICATION OPTION
	1-45	-	Comments
	46-50	NITROP	Parameter controlling nitrification options:

NITROP	OPTION
0	Read in rates and pattern.
1	Standard rates and pattern.
2	Standard pattern; read in rates.
3	High rates in standard pattern

	51-55	ND	The number of discrete reaches in which different reaction rates apply. This is used only if NITROP = 0. If ND = 0 and NITROP = 0, then NITROP is set equal to 1.
			If NITROP = 1 or 3, then Cards A.2.2, A.2.3, and A.2.4 are deleted. If NITROP = 2, then Card A.2.2 is read and Cards A.2.3 and A.2.4 are deleted. If NITROP = 0, then the choice of cards to be read is controlled by ND. For ND = 0, Cards A.2.2, A.2.3 and A.2.4 are deleted. For ND between 1 and 30, Card A.2.3 is read ND times. For ND between 101 and 130, Card A.2.4 is read ND - 100 times.
A.2.2			NITRIFICATION RATES FOR STANDARD PATTERN
	1-45		Comments
	-	-	The following are nitrification rates applied to general reaches of the estuary (some reach lengths vary with temperature):

TABDS	COLUMNS	VARIABLE NAME	DESCRIPTION
	46-50	RNIT(I)	Rate for tidal tributaries and upper estuary between Trenton and Fieldsboro.
	51-55	RNIT(2)	Rate for growth zone between Fieldsboro and Bristol.
	56-60	RNIT(3)	Rate for uninhibited nitrification zone from Bristol to Philadelphia.
	61-65	RNIT(4)	Rate for inhibited zone at Philadelphia.
	66-70	RNIT(5)	Rate for regrowth zone just below Philadelphia
	71-75	RNIT(6)	Rate for maximum nitrification zone, generally between Chester and Wilmington.
	76-80	RNIT(7)	Rate for mature nitrification zone, generally at or below Wilmington.
A.2.3			NITRIFICATION RATES BY MODEL JUNCTION
	1-10	NJF	First junction in reach for which reaction rate DECAY applies.
	11-20	NJL	Last junction in reach for which reaction rate DECAY applies.
	21-30	DECAY	Nitrification rate (20 C.) in all junctions between NJF and NJL.
.2.4			NITRIFICATION RATES BY RIVER MILE
	1-10	RM(I)	First river mile at which reaction rate RXN(I) applies.
	11-20	RM(II)	Last river mile at which reaction rate RXN(I) applies.
	21-30	RXN(I)	Nitrification rate (20 C) in all junctions between RM(I) and RM(II).

CARDS	COLUMNS	VARIABLE NAME	DESCRIPTION
(A.3.n)			(NEW DO BUDGET RATES)
			Cards VII.A.3.n (n = 1-25) are the same as Cards II.B.3.4.n.
B.1			NEW OBSERVED DATA PERIOD
	1-45	-	Comments
	46-50	NDACYC	Last quality cycle for which new observed data apply. On cycle NDACYC + 1, new observed data are again read in.
B.2			HEADER FOR TRANSECT POSITION
	1-80	HEADER	Alphanumeric identifier for transect position of observed data.
B.3			NEW OBSERVED DATA
	1-5	DATA(I11,J11,1,L)	Observed data at transect position L and longitudinal location K (third index), for constituent J11 at date I Location K here must correspond to RDATA(K) on card I.E.6. The index I11 (=1,2,3) can stand for either three dates or the high, average, and the low data points taken during a sampling period.
	6-10	DATA(I11,J11,2,L)	
	11-15	DATA(I11,J11,3,L)	
	16-20	DATA(I11,J11,4,L)	
	21-25	DATA(I11,J11,5,L)	
	26-30	DATA(I11,J11,6,L)	
	31-35	DATA(I11,J11,7,L)	
	36-40	DATA(I11,J11,8,L)	
	41-45	DATA(I11,J11,9,L)	
	46-50	DATA(I11,J11,10,L)	
	51-55	DATA(I11,J11,11,L)	
	56-60	DATA(I11,J11,12,L)	
	61-65	DATA(I11,J11,13,L)	
	66-70	DATA(I11,J11,14,L)	
	71-75	DATA(I11,J11,15,L)	
	76-80	DATA(I11,J11,16,L)	

If NMODE = 1 (card I.B.2), then Card VII.B.2 is read once and Card VII.B.3 is read 15 times (Date I11 = 1, constituent J11 = 1-5; Date I11 = 2, constituent J11 = 1-5; and Date I11 = 3, constituent J11 = 1-5). L = 1, signifying center channel data.

CARDS	COLUMNS	VARIABLE NAME	DESCRIPTION

If NMODE = 2, then the set of Card I.B.2(once) and Cards I.B.3(fifteen) is read in three times, for L = 1 (center channel), L = 2 (Pennsylvaina side), and L = 3 (New Jersey side).

CHAPTER 5

DYNDELA MODEL APPLICATION - TEST CASES

DYNDELA was designed to be as flexible a model as possible. The one program provides for two networks; a wide variety of water quality interactions; several ways to input and modify waste loads, either individually or grouped by location and type; a mechanism for varying such environmental conditions as flow, temperature, wind, algal levels, and benthic effects throughout the simulation; and many output options, including waste load analysis by zone and type, output data transformations, slack water tables and plots, summary period tables, plots, and descriptive statistics, and station time plots. All these options lead to complexity in the input data. To reduce this complexity somewhat, part of the program has been hard coded to the Delaware Estuary. Internal coding, for example, handles such phenomena as the variation in longitudinal dispersion patterns as a function of freshwater flow at Trenton or the tracking of slack tide progression in output tables and plots. Default values are available for most of the dissolved oxygen budget interactions.

The following test cases illustrate how to specify input data to handle many of the options available in this program. Complete output listings for each case are given in the Appendix.

5.1 SALINITY INTRUSION

The movement of chlorides in the Delaware Estuary was a major early component of this modeling study, as reported in AFO TR 62 [9]. Because of the location of the seaward boundary in an area of large salinity gradients, DYNDELA is not set up for a definitive study of the intrusion process. Rather, chloride data were used as a conservative

tracer to calibrate and verify the advective and dispersive transport mechanisms in the model for the hydraulically complex reaches between Wilmington and Liston Point.

Table 5-1 gives the input data used to simulate the observed chloride movement between May 7 and 22, 1968. The hydraulic program DYNHYD was used to generate the time varying flows and stages used by DYNDELA. As in all of the DYNHYD simulations, the first hydraulic cycle began with high water at Liston Point, the seaward boundary. A stationary state, repetitive solution was achieved between hydraulic cycles 150 and 300, which are specified on Card 5. The counter NTAG relates hydraulic cycles to quality cycles as it progresses 1, 2, 3, ... , 24/0, 1, 2, ...; this sequence corresponds to hydraulic cycles 150, 156, 162, ... , 294, 300/150, 156, ... (for the 1-D network, with NODYN=6 on Card 5). Examination of the hydraulic solutions revealed that the values of NTAG for the start of flood tide, the start of ebb tide, the duration of flood, and the end of ebb (all at Liston Point) are as given on Card 6. For convenience, most of the quality simulations were initiated at high slack tide at Liston Point. NTAG is then initialized at 4, corresponding to hydraulic cycle 168. These are given on Card 8, along with the initial quality cycle of 1 and the final quality cycle of 725.

Several output options are demonstrated between Cards 14 and 60. Since no kinetics are involved in chloride movement, printout is deleted from Section 2.2 (KDELP2=1 on Card 15). A summary is requested between cycles 700 and 725, along with associated plots and statistics (Cards 18 and 19). The junctions and constituents to be described by statistics are given on Cards 21 and 22. Four slack water tables are requested (Cards 24 - 28); the plots of constituent 5 from the low slack tables (KSLACK=3) will be overlaid on the plots of constituent 5 from the high slack tables (KSLACK=1). This is achieved by specifying KTABLE's of 3 and 4 successive slack water output cards.

TABLE 5-1
INPUT DATA FOR SALINITY

```
        1         2         3         4         5         6         7         8  CARD
        0         0         0         0         0         0         0         0 NUMBER

SECTION 2.1                  SET PROGRAM CONTROL OPTIONS                              00000001
DELAWARE ESTUARY 1-D NETWORK, TRENTON-LISTON POINT, DELAWARE R FLOW = 12,300FCFS      00000002
                  SIMULATION PERIOD : MAY 7 - MAY 22, 1968                           00000003
**** SYSTEM INFORMATION FROM DYNAMIC FLOW PROGRAM *****                               00000004
   76   82  150  300    6    1    5    1                                             00000005
NSFLD,NSERR,NDURF,NENUE:                          18    4   11   17                 00000006
***** INDEPENDENT CONTROL DATA *****                                                 00000007
NRSTRT,INCYC,NUCYC,KZOP,KDCOP,NTAG               168    1  725    0    3    4      00000008
CTIME1,TSRISE,TSSET :                            0.0  6.0 18.0                     00000009
NGROUP:                                            0    0    0    0    0          00000010
LGROUP:                                            0    0    0    0               00000011
MGROUP:                                            0    0    0    0    0          00000012
 VARYING WASTE CONTROL :                                                            00000013
**********  PRINTOUT CONTROL PARAMETERS  **************                             00000014
    0    1    0    0    0    0    0    0    0                                      00000015
RESTART CONTROL                                  1200  200                        00000016
                SUMMARY OUTPUT CONTROL                                              00000017
SUMARY1                                            1                               00000018
  700  725    1    1                                                                00000019
SUMARY2                                            0                               00000020
STATS                                             11    1    0    0    0    0      00000021
    2   11   12   13   20   22   23   24   25   31   32                            00000022
          SLACK WATER / PROFILE OUTPUT CONTROL                                      00000023
   25          1    3                                                             00000024
   39          3    4                                                             00000025
  700          1    3                                                             00000026
  714          3    4                                                             00000027
                  END OF PRINT CYCLES                                               00000028
OUTPUT TRANSFORMATION - ADDITION :                 5    0    1    0    0    0      000000029
OUTPUT TRANSFORMATION - MULTIPLICATION :           0    0    0                      00000030
OUTPUT TRANSFORMATION - LOGARITHMS :               0                               00000031
                  PLOTTER CONTROL INFORMATION                                       00000032
    8    1    5 2400    2 5000    0    0    0    0    0    0    0 5000    0        00000033
   12              1  725   25    1                                                00000034
   12            250  725    1    1                                                00000035
   20              1  725   25    1                                                00000036
   20            250  725    1    1                                                00000037
   25              1  725   25    1                                                00000038
   25            250  725    1    1                                                00000039
   32              1  725   25    1                                                00000040
   32            250  725    1    1                                                00000041
CONSTITUENT CHOICE CARD FOR PROFILE PLOTS          1    0    0    0    1          00000042
***************  OBSERVED DATA FOR PROFILE PLOTS  ***************                 00000043
 58.5 62.5 67.0 73.0 78.5                                                           00000044
   MID - CHANNEL DATA                                                               00000045
   15   15  300 1000 2700                                                          00000046
    0                                                                               00000047
    0                                                                               00000048
    0                                                                               00000049
    0                                                                               00000050
   50  100  400 1200 2300                                                          00000051
    0                                                                               00000052
```

```
     0
     0
     0
    50  100  400 1200 2300
     0
     0
     0
     0
SECTION 2.2          DEFINE WATER QUALITY CONSTITUENTS
***** QUALITY COEFFICIENTS *****
NUMBER OF CONSTITUENTS:                          1    0    0    0
                         CONSTITUENT 1 IS CHLORIDES (MG/L)
     0
     0
     0
 10000000. 10000000.
    WATER TEMPERATURE  :                         1 2400  20.
***** ADJUST CONSTITUENT DECAY RATES *****
SALINITY (NO DECAY)                              0
SECTION 2.3          SPECIFY WASTEWATER AND TRIBUTARY LOADS
***** FACTORS TO ADJUST INFLOW LOADINGS *****
***************  CONSTANT WASTE LOADINGS  **************
   17    1    5
3   SALEM  TRIB    1    1                        -15.0 15.0
   29    1    5
3 CHRISTNA TRIB    1    1                       -200.0 15.0
   30    1    5
3 BRANDYWN TRIB    1    1                       -400.0 15.0
   34    1    4
3 MARCUSHK TRIB    1    1                        -49.0 15.0
   36    1    4
3  CHESTER TRIB    1    1                        -83.0 15.0
   40    1    4
3   DARBY  TRIB    1    1                        -60.0 15.0
   43    1    4
3  MANTUA  TRIB    1    1                        -24.0 15.0
   47    1    4
3 SCHULKIL TRIB    1    1                      -1500.0  5.0
   54    1    3
3  COOPER  TRIB    1    1                        -32.0 15.0
   55    1    3
1 PHILA NE MUN     1    1                       -255.0 50.0
   57    1    3
3 PENSAUKN TRIB    1    1                        -14.0 15.0
   61    1    2
3 RANCOCAS TRIB    1    1                       -175.0 15.0
   65    1    2
3 NESHAMNY TRIB    1    1                       -160.0 15.0
   73    1    2
3 CROSWICK TRIB    1    1                        -64.0 15.0
                  END OF CONSTANT WASTEWATER INPUTS
   76    1    1
3 DELAWARE RIVR    1    1                     -12300.0  15.
                  END OF CONSTANT WASTEWATER INPUT SECTION
 *************   VARYING  WASTE LOADING  PARAMETERS  ************
SECTION 2.4          SPECIFY WATER QUALITY BOUNDARY CONDITIONS
  DELAWARE RIVR   10    1                        25    1   14    1
 SEAWARD BOUNDARY , NODE 1  MAY 1968            2400 100.
 SEAWARD BOUNDARY , NODE 2                        50 4500
 SEAWARD BOUNDARY , NODE 2                        50 4435
 SEAWARD BOUNDARY , NODE 2                        50 4370
```

```
 SEAWARD BOUNDARY . NODE 2                    50 4305                    00000114
 SEAWARD BOUNDARY . NODE 2                    50 4240                    00000115
 SEAWARD BOUNDARY . NODE 2                    50 4175                    00000116
 SEAWARD BOUNDARY . NODE 2                    50 4110                    00000117
 SEAWARD BOUNDARY . NODE 2                    50 4045                    00000118
 SEAWARD BOUNDARY . NODE 2                    50 3980                    00000119
 SEAWARD BOUNDARY . NODE 2                    50 3915                    00000120
 SEAWARD BOUNDARY . NODE 2                    50 3850                    00000121
 SEAWARD BOUNDARY . NODE 2                    50 3785                    00000122
 SEAWARD BOUNDARY . NODE 2                    50 3720                    00000123
 SEAWARD BOUNDARY . NODE 2                    50 3655                    00000124
UPSTREAM BOUNDARY DISCHARGE                 2400-1230  15.              00000125
SECTION 2.6          SPECIFY INITIAL WATER QUALITY CONDITIONS           00000126
   01      100.                                                         00000127
    2     4500.                                                         00000128
    3     0250.                                                         00000129
    4     0400.                                                         00000130
    5     0600.                                                         00000131
    6     0800.                                                         00000132
    7     1000.                                                         00000133
    8     1200.                                                         00000134
    9     1350.                                                         00000135
   10     1500.                                                         00000136
   11     3600.                                                         00000137
   12     2700.                                                         00000138
   13     1650.                                                         00000139
   14     1650.                                                         00000140
   15     1400.                                                         00000141
   16     1200.                                                         00000142
   17     1000.                                                         00000143
   18     1000.                                                         00000144
   19     1200.                                                         00000145
   20     1000.                                                         00000146
   21     0750.                                                         00000147
   22     0500.                                                         00000148
   23     0200.                                                         00000149
   24     0075.                                                         00000150
   25       20.                                                         00000151
   26       16.                                                         00000152
   27       12.                                                         00000153
   28        8.                                                         00000154
   29        4.                                                         00000155
   30       12.                                                         00000156
   31       20.                                                         00000157
   32       20.                                                         00000158
   33       20.                                                         00000159
   34       20.                                                         00000160
   35       18.                                                         00000161
   36       18.                                                         00000162
   37       18.                                                         00000163
   38       18.                                                         00000164
   39       17.                                                         00000165
   40        8.                                                         00000166
   41       15.                                                         00000167
   42       15.                                                         00000168
   43       15.                                                         00000169
   44       15.                                                         00000170
   45       12.                                                         00000171
   46        8.                                                         00000172
   47        4.                                                         00000173
   48       15.                                                         00000174
```

```
   49        15.
   50        15.
   51        15.
   52        15.
   53        15.
   54        15.
   55        15.
   56        15.
   57        15.
   58        15.
   59        15.
   60        15.
   61        15.
   62        15.
   63        15.
   64        15.
   65        15.
   66        15.
   67        15.
   68        15.
   69        15.
   70        15.
   71        15.
   72        15.
   73        15.
   74        15.
   75        15.
   76        15.
***************  FACTORS TO ADJUST INITIAL CONCENTRATIONS  ( NGROUP )  ***********
SECTION 2.8   SET ADVECTIVE AND DISPERSIVE TRANSPORT FACTORS
FACTORS : KADV,CDIFFK,XCU,XCD,XCEBB                2  1.0 0.33 0.67 0.33
************ VARYING ADVECTION FACTORS : N,YCU,YCD  ***************
    1                 1.0
    2                 1.0
    3                 1.0
    4                 1.0
    5                 1.0
    6                 1.0
    7                 1.0
    8                 1.0
    9                 .60
   10                 .33
   11                 .20
   12                 1.0
   13                 .20
   14                 .20
   15                 .50
   16                 .50
   17                 .50
   18                 .50
   19                 .50
   20                 .50
   21                 .50
   22                 .50
   23                 .50
   24                 .50
99999
************ VARYING ADVECTION FACTORS : N,YCEBB  ***************
    1
    2
    3
```

```
     4                                                                                00000236
     5                                                                                00000237
     6                                                                                00000238
     7                                                                                00000239
     8                                                                                00000240
     9                                                                                00000241
    10                                                                                00000242
    11                                                                                00000243
    13                                                                                00000244
    14                                                                                00000245
    15                                                                                00000246
    16                                                                                00000247
    17                                                                                00000248
    18                                                                                00000249
    19                                                                                00000250
    20        .10                                                                     00000251
    21                                                                                00000252
    22                                                                                00000253
    23                                                                                00000254
    24        .25                                                                     00000255
99999                                                                                00000256
VARYING LONGITUDINAL DISPERSION (C4):          10.0 25.0 50.0 75.0100.0              00000257
SECTION 3.0  SIMULATE WATER QUALITY CONDITIONS (MAIN QUALITY LOOP)                   00000258
```

Since no constituent 5 will actually be simulated, a special output constituent 5 is created by Card 29 from the sum of constituent 1 and no others. Thus output constituents 1 and 5 are identical, but plotted differently: the first with observed data (Cards 46, 51, 56), the fifth with both slack profiles.

Eight station time plots requested on Card 33 are detailed on Cards 34 through 41. Half of these plot constituent 1 every 25th cycle for the entire simulation, thus showing net, non-tidal movement. The other half plot constituent 1 every cycle between 250 and 725, showing tidal fluctuations. Other parameters on Card 33 tell the program to plot slack tables (MGCYC=1) along with 5 observed data points on a medium density grid (KPLOP=2) with a plotting range for constituents 1 and 5 between 5000 and 0. New observed data will not be expected before 2400 cycles.

Slack water plots are limited to constituents 1 and 5 on Card 42. The location of observed data is specified on Card 44. Cards 46 through 50 give observed data for constituents 1 through 5 to be plotted by the symbol X; these correspond to initial conditions on May 7. The observed data to be plotted by symbol A (Cards 51 - 55) are identical to and thus overlaid by symbol O (Cards 56 - 60). These correspond to observed conditions on May 22.

Section 2.2 is abbreviated here because chlorides undergo no decay or transformation. Card 63 limits the simulation to one constituent which Card 64 names and Card 65 specifies to be conservative. No constituent linkages or functions are given (Cards 66 and 67). The water temperature on Card 69 is academic, due to lack of kinetics. Finally, a reaction variability card (Card 71) is read with zero associated rate cards.

Section 2.3 gives the constant tributary inputs of chlorides. The information on Cards 104 and 105 is used only in the input load summary table.

Section 2.4 deals with the two seaward boundaries and the upstream boundary. Card 109 gives the number of discrete values for Nodes 1, 2, and the upstream boundary as 1, 14, and 1. Card 110

specifies that the concentration at node 1 for 2400 cycles is 100. Cards 111 through 124 give 14 values at node 2 for specified intervals; here each are 50 cycles in length. Notice that the sum of the given intervals is 700, whereas the simulation lasts 725 cycles. The boundary simply repeats the original progression after cycle 700, in this case jumping from 3655 at cycle 700 to 4500 at cycle 701.

Card 125 gives the upstream boundary discharge of 1230 cfs and 15 mg/l. The discharge is multiplied by the factor of 10 given on Card 109. Concentrations for constituent 1 on all cards (110 - 125) are multiplied by 1.

Section 2.6 lists the initial concentrations for each junction in a straightforwardway. Section 2.8 contains transport factors calibrated during the model salinity studies. These are now fixed and should not be altered.

Section 3.0 has no data because no new environmental conditions or observed data are to be input during the simulation.

5.2 DYE TRACER MOVEMENT

A special dye study was performed during July and August 1974 to study the movement of a tracer from the Philadelphia N.E. Sewage Treatment Plant through the freshwater tidal river. This study is described in AFO TR 62 [9]. Because the freshwater flow varied significantly during the study period, the simulation was broken into a series of four runs. The final concentrations from each run were saved on a restart file to be input as initial conditions for the suceeding run. Four separate hydraulic solutions were saved to drive the four runs. Tables 5-2 and 5-3 give the input data used to simulate the first two periods.

The first period (Table 5-2) begins at 12 noon (Card 9) July 22. The initial tidal conditions most closely correspond to hydraulic cycle 156, with NTAG=2 (Card 8). The depletion correction option of 2 allows mass decayed below zero to be reset to zero without later subtracting off this "additional" mass of numerical origin. This

TABLE 5-2
INPUT DATA FOR INITIAL DYE

```
         1         2         3         4         5         6         7         8  CARD
         0         0         0         0         0         0         0         0 NUMBER

SECTION 2.1                SET PROGRAM CONTROL OPTIONS                          00000001
DELAWARE ESTUARY 1-D NETWORK, DYE STUDY PERIOD 1. DELAWARE R FLOW = 3900 CFS    00000002
            SIMULATION PERIOD : JULY 22 - 31 , 1974                             00000003
***** SYSTEM INFORMATION FROM DYNAMIC FLOW PROGRAM *****                        00000004
                                                                                00000005
   76    82   150   300     6     1     5     1                                 00000006
NSFLD,NSERR,NDURF,NENDE:                          18     4    11    17          00000007
***** INDEPENDENT CONTROL DATA *****                                            00000008
NHSTRT,INCYC,NOCYC,KZOP,KDCOP,NTAG               156     1   448     0     2     2 00000009
CTIME1,TSRISE,TSSET :                           12.0   6.0  18.0                00000010
NGROUP:                                            0     0     0     0     0    00000011
LGROUP:                                            0     0     0     0     0    00000012
MGROUP:                                            0     0     0     0     0    00000013
 VARYING WASTE CONTROL :                           1                            00000014
**********  PRINTOUT CONTROL PARAMETERS  ***************                        00000015
    0     0     0     0     0     0     0     0                                 00000016
RESTART CONTROL                                    1    50                      00000017
              SUMMARY OUTPUT CONTROL                                            00000018
SUMARY1                                            0                            00000019
SUMARY2                                            0                            00000020
STATS                                              0                            00000021
           SLACK WATER / PROFILE OUTPUT CONTROL                                 00000022
     2           1     2                                                        00000023
    41           3     2                                                        00000024
    52           1     2                                                        00000025
    91           3     2                                                        00000026
   102           1     2                                                        00000027
   141           3     2                                                        00000028
   152           1     2                                                        00000029
   191           3     2                                                        00000030
   202           1     2                                                        00000031
   227           1     2                                                        00000032
   327           1     2                                                        00000033
   377           1     2                                                        00000034
   427           1     2                                                        00000035
                  END OF PRINT CYCLES                                           00000036
OUTPUT TRANSFORMATION - ADDITION :                 0     0     0     0          00000037
OUTPUT TRANSFORMATION - MULTIPLICATION :           0     0     0                00000038
OUTPUT TRANSFORMATION - LOGARITHMS :               0                            00000039
                  PLOTTER CONTROL INFORMATION                                   00000040
     4     1    16    41     2   140     0                                      00000041
    60                 7   447    25     1                                      00000042
    60                 7   447     1     1                                      00000043
    55                 7   447    25     1                                      00000044
    55                 7   447     1     1                                      00000045
CONSTITUENT CHOICE CARD FOR PROFILE PLOTS          1                            00000046
**********  OBSERVED DATA FOR PROFILE PLOTS  ***************                    00000047
  20.0  22.5  25.0  27.5  30.0  32.5  35.0  37.5  40.0  42.5  45.0  47.5  50.0  52.5  55.0  57.500000047
                        MID - CHANNEL DATA                                      00000048
     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     000000049
     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     000000050
     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     000000051
     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     000000052
```

```
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000053
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000054
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000055
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000056
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000057
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000058
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000059
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000060
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000061
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000062
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000063
SECTION 2.2          DEFINE WATER QUALITY CONSTITUENTS                        00000064
***** QUALITY COEFFICIENTS *****                                             00000065
NUMBER OF CONSTITUENTS:                          1    0    0    0            00000066
                        CONSTITUENT 1 IS DYE (UG/L)                          00000067
   1                                                                         00000068
 -1.0                                                                        00000069
    0                                                                        00000070
   100.       100.                                                          00000071
   WATER TEMPERATURE  :                          1 2400  20.               00000072
***** ADJUST CONSTITUENT DECAY RATES *****                                   00000073
DYE LOSS RATE                                    1  1.0                     00000074
     1          76       0.02                                               00000075
SECTION 2.3          SPECIFY WASTEWATER AND TRIBUTARY LOADS                  00000076
      ***** FACTORS TO ADJUST INFLOW LOADINGS *****                          00000077
    ***************  CONSTANT WASTE LOADINGS  ***************               00000078
                 END OF CONSTANT WASTEWATER INPUTS                           00000079
               END OF CONSTANT WASTEWATER INPUT SECTION                      00000080
 ***************   VARYING  WASTE LOADING  PARAMETERS  *************         00000081
  PHILA NE MUN  1.55     1                        55    2 2400    1    3      00000082
     196                -164.5       24.8                                   00000083
    2204                -164.5        0.0                                   00000084
SECTION 2.4          SPECIFY WATER QUALITY BOUNDARY CONDITIONS                00000085
  DELAWARE RIVR    1     1                        25    1    1    1           00000086
 SEAWARD BOUNDARY , NODE 1                      2400  00.                    00000087
 SEAWARD BOUNDARY , NODE 2                      2400   0.                    00000088
UPSTREAM BOUNDARY DISCHARGE                     2400-3900   0.               00000089
SECTION 2.6          SPECIFY INITIAL WATER QUALITY CONDITIONS                 00000090
    76       0.                                                              00000091
***************  FACTORS TO ADJUST INITIAL CONCENTRATIONS  ( NGROUP )  **********00000092
SECTION 2.8    SET ADVECTIVE AND DISPERSIVE TRANSPORT FACTORS                00000093
FACTORS : KADV,CDIFFK,XCU,XCD,XCE88              2  1.0 0.33 0.67 0.33       00000094
************ VARYING ADVECTION FACTORS : N,YCU,YCD  ***************          00000095
    1                1.0                                                     00000096
    2                1.0                                                     00000097
    3                1.0                                                     00000098
    4                1.0                                                     00000099
    5                1.0                                                     00000100
    6                1.0                                                     00000101
    7                1.0                                                     00000102
    8                1.0                                                     00000103
    9                .60                                                     00000104
   10                .33                                                     00000105
   11                .20                                                     00000106
   12                1.0                                                     00000107
   13                .20                                                     00000108
   14                .20                                                     00000109
   15                .50                                                     00000110
   16                .50                                                     00000111
   17                .50                                                     00000112
   18                .50                                                     00000113
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   19                .50                                                        00000114
   20                .50                                                        00000115
   21                .50                                                        00000116
   22                .50                                                        00000117
   23                .50                                                        00000118
   24                .50                                                        00000119
99999                                                                           00000120
************ VARYING ADVECTION FACTORS : N,YCEBB  ***************              00000121
    1                                                                           00000122
    2                                                                           00000123
    3                                                                           00000124
    4                                                                           00000125
    5                                                                           00000126
    6                                                                           00000127
    7                                                                           00000128
    8                                                                           00000129
    9                                                                           00000130
   10                                                                           00000131
   11                                                                           00000132
   13                                                                           00000133
   14                                                                           00000134
   15                                                                           00000135
   16                                                                           00000136
   17                                                                           00000137
   18                                                                           00000138
   19                                                                           00000139
   20        .10                                                                00000140
   21                                                                           00000141
   22                                                                           00000142
   23                                                                           00000143
   24        .25                                                                00000144
99999                                                                           00000145
VARYING LONGITUDINAL DISPERSION (C4):          10.0 25.0 50.0 75.0100.0          00000146
SECTION 3.0  SIMULATE WATER QUALITY CONDITIONS (MAIN QUALITY LOOP)              00000147
NEW OBSERVED DATA , JULY 23 , LS TIDE          52                               00000148
                              MID - CHANNEL DATA                                00000149
    0    0    0    0 0.28 0.23 0.13 0.06 0.02    0    0    0    0    0    0    000000150
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000151
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000152
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000153
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000154
    0    0    0    0 0.28 0.23 0.13 0.06 0.02    0    0    0    0    0    0    000000155
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000156
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000157
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000158
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000159
    0    0    0    0 0.28 0.23 0.13 0.06 0.02    0    0    0    0    0    0    000000160
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000161
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000162
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000163
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000164
NEW OBSERVED DATA , JULY 23 , HS TIDE          91                               00000165
                              MID - CHANNEL DATA                                00000166
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000167
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000168
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000169
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000170
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000171
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000172
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000173
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000174
```

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    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000175
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000176
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000177
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000178
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000179
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000180
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000181
NEW OBSERVED DATA , JULY 24 , LS TIDE          102                                 00000182
                              MID - CHANNEL DATA                                   00000183
    0    0    0 0.02 0.07 0.12 0.18 0.26 0.20 0.09 0.03    0    0    0    0    000000184
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000185
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000186
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000187
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000188
    0    0    0 0.02 0.07 0.12 0.18 0.26 0.20 0.09 0.03    0    0    0    0    000000189
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000190
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000191
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000192
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000193
    0    0    0 0.02 0.07 0.12 0.18 0.26 0.20 0.09 0.03    0    0    0    0    000000194
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000195
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000196
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000197
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000198
NEW OBSERVED DATA , JULY 24 , HS TIDE          141                                 00000199
                              MID - CHANNEL DATA                                   00000200
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000201
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000202
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000203
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000204
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000205
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000206
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000207
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000208
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000209
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000210
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000211
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000212
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000213
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000214
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000215
NEW OBSERVED DATA , JULY 25 , LS TIDE          152                                 00000216
                              MID - CHANNEL DATA                                   00000217
    0    0    0 0.02 0.73 0.70 0.37 0.21 0.13 0.07 0.03    0    0    0    0    000000218
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000219
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000220
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000221
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000222
    0    0    0 0.02 0.73 0.70 0.37 0.21 0.13 0.07 0.03    0    0    0    0    000000223
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000224
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000225
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000226
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000227
    0    0    0 0.02 0.73 0.70 0.37 0.21 0.13 0.07 0.03    0    0    0    0    000000228
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000229
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000230
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000231
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000232
NEW OBSERVED DATA , JULY 25 , HS TIDE          191                                 00000233
                              MID - CHANNEL DATA                                   00000234
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000235
```

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    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000236
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000237
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000238
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000239
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000240
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000241
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000242
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000243
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000244
    0    0    0    0    0    0    0    .    0    0    0    0    0    0    0    000000245
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000246
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000247
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000248
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000249
NEW OBSERVED DATA , JULY 26 , LS TIDE          202                                 00000250
                                MID - CHANNEL DATA                                 00000251
    0    0    0 0.03 0.28 0.46 0.43 0.35 0.25 0.12 0.04    0    0    0    0    000000252
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000253
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000254
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000255
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000256
    0    0    0 0.03 0.28 0.46 0.43 0.35 0.25 0.12 0.04    0    0    0    0    000000257
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000258
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000259
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000260
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000261
    0    0    0 0.03 0.28 0.46 0.43 0.35 0.25 0.12 0.04    0    0    0    0    000000262
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000263
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000264
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000265
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000266
NEW OBSERVED DATA , JULY 26 , HS TIDE          227                                 00000267
                                MID - CHANNEL DATA                                 00000268
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000269
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000270
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000271
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000272
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000273
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000274
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000275
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000276
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000277
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000278
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000279
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000280
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000281
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000282
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000283
NEW OBSERVED DATA , JULY 27 , HS TIDE          327                                 00000284
                                MID - CHANNEL DATA                                 00000285
 0.18 0.34 0.44 0.47 0.43 0.35 0.20 0.12 0.04    0    0    0    0    0    0    000000286
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000287
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000288
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000289
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000290
 0.18 0.34 0.44 0.47 0.43 0.35 0.20 0.12 0.04    0    0    0    0    0    0    000000291
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000292
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000293
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000294
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000295
 0.18 0.34 0.44 0.47 0.43 0.35 0.20 0.12 0.04    0    0    0    0    0    0    000000296
```

```
     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     000000297
     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     000000298
     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     000000299
     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     000000300
NEW OBSERVED DATA , JULY 29 , HS TIDE          377                                            00000301
                                MID - CHANNEL DATA                                            00000302
     0 0.07 0.23 0.35 0.40 0.39 0.32 0.24 0.16 0.09 0.03     0     0     0     0     000000303
     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     000000304
     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     000000305
     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     000000306
     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     000000307
     0 0.07 0.23 0.35 0.40 0.39 0.32 0.24 0.16 0.09 0.03     0     0     0     0     000000308
     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     000000309
     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     000000310
     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     000000311
     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     000000312
     0 0.07 0.23 0.35 0.40 0.39 0.32 0.24 0.16 0.09 0.03     0     0     0     0     000000313
     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     000000314
     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     000000315
     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     000000316
     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     000000317
NEW OBSERVED DATA , JULY 30 , HS TIDE          427                                            00000318
                                MID - CHANNEL DATA                                            00000319
     0 0.10 0.21 0.30 0.37 0.35 0.28 0.21 0.16 0.10 0.06 0.03 0.01     0     0     000000320
     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     000000321
     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     000000322
     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     000000323
     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     000000324
     0 0.10 0.21 0.30 0.37 0.35 0.28 0.21 0.16 0.10 0.06 0.03 0.01     0     0     000000325
     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     000000326
     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     000000327
     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     000000328
     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     000000329
     0 0.10 0.21 0.30 0.37 0.35 0.28 0.21 0.16 0.10 0.06 0.03 0.01     0     0     000000330
     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     000000331
     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     000000332
     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     000000333
     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     000000334
NEW OBSERVED DATA , JULY 31 , HS TIDE          450                                            00000335
                                MID - CHANNEL DATA                                            00000336
     0 0.05 0.13 0.20 0.28 0.32 0.28 0.23 0.18 0.11 0.06 0.03     0     0     0     000000337
     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     000000338
     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     000000339
     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     000000340
     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     000000341
     0 0.05 0.13 0.20 0.28 0.32 0.28 0.23 0.18 0.11 0.06 0.03     0     0     0     000000342
     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     000000343
     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     000000344
     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     000000345
     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     000000346
     0 0.05 0.13 0.20 0.28 0.32 0.28 0.23 0.18 0.11 0.06 0.03     0     0     0     000000347
     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     000000348
     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     000000349
     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     000000350
     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     000000351
```

TABLE 5-3
INPUT DATA FOR RESTART DYE

```
         1         2         3         4         5         6         7         8  CARD
         0         0         0         0         0         0         0         0 NUMBER

SECTION 2.1                SET PROGRAM CONTROL OPTIONS                          00000001
DELAWARE ESTUARY 1-D NETWORK, DYE STUDY PERIOD 2. DELAWARE R FLOW = 8850 CFS    00000002
                  SIMULATION PERIOD : AUG 1 - AUG 3, 1974                       00000003
***** SYSTEM INFORMATION FROM DYNAMIC FLOW PROGRAM *****                       00000004
   76    82   150   300     6     1     5     1                                00000005
NSFLD,NSEBR,NDURF,NENDE:                          18     4    11    17         00000006
***** INDEPENDENT CONTROL DATA *****                                           00000007
NRSTRT,INCYC,NQCYC,KZOP,KDCOP,NTAG               294   449   598     1     2     0 00000008
CTIME1,TSRISE,TSSET :                           12.0   6.0  18.0               00000009
NGROUP:                                            0     0     0     0     0    00000010
LGROUP:                                            0     0     0     0          00000011
MGROUP:                                            0     0     0     0     0    00000012
 VARYING WASTE CONTROL :                           1                            00000013
*************  PRINTOUT CONTROL PARAMETERS  ***************                    00000014
    0     1     0     0     0     0     0     0                                 00000015
RESTART CONTROL                                    1    50                      00000016
                SUMMARY OUTPUT CONTROL                                          00000017
SUMARY1                                            0                            00000018
SUMARY2                                            0                            00000019
STATS                                              0                            00000020
          SLACK WATER / PROFILE OUTPUT CONTROL                                  00000021
  477             1    2                                                       00000022
  527             1    2                                                       00000023
  577             1    2                                                       00000024
                          END OF PRINT CYCLES                                   00000025
OUTPUT TRANSFORMATION - ADDITION :                 0     0     0     0          00000026
OUTPUT TRANSFORMATION - MULTIPLICATION :           0     0     0                00000027
OUTPUT TRANSFORMATION - LOGARITHMS :               0                            00000028
                          PLOTTER CONTROL INFORMATION                           00000029
    4     1    16  527     2   1.0     0                                        00000030
   60              27  597    25     1                                         00000031
   60              27  597     1     1                                         00000032
   55              27  597    25     1                                         00000033
   55              27  597     1     1                                         00000034
CONSTITUENT CHOICE CARD FOR PROFILE PLOTS          1                            00000035
*****************  OBSERVED DATA FOR PROFILE PLOTS  ****************           00000036
 20.0 22.5 25.0 27.5 30.0 32.5 35.0 37.5 40.0 42.5 45.0 47.5 50.0 52.5 55.0 57.500000037
                                MID - CHANNEL DATA                              00000038
    0    0    0 0.01 0.05 0.10 0.20 0.32 0.32 0.25 0.19 0.13 0.08 0.05 0.01    000000039
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000040
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000041
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000042
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000043
    0    0    0 0.01 0.05 0.10 0.20 0.32 0.32 0.25 0.19 0.13 0.08 0.05 0.01    000000044
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000045
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000046
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000047
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000048
    0    0    0 0.01 0.05 0.10 0.20 0.32 0.32 0.25 0.19 0.13 0.08 0.05 0.01    000000049
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000050
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000051
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000052
```

```
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000053
SECTION 2.2          DEFINE WATER QUALITY CONSTITUENTS                                   00000054
***** QUALITY COEFFICIENTS *****                                                         00000055
NUMBER OF CONSTITUENTS:                          1    0    0    0                       00000056
                        CONSTITUENT 1 IS DYE (UG/L)                                     00000057
   1                                                                                    00000058
  -1.0                                                                                  00000059
   0                                                                                    00000060
    100.       100.                                                                     00000061
    WATER TEMPERATURE  :                          1 2400  20.                         00000062
***** ADJUST CONSTITUENT DECAY RATES *****                                             00000063
DYE LOSS RATE                                     1  1.0                               00000064
      1          76       0.02                                                        00000065
SECTION 2.3          SPECIFY WASTEWATER AND TRIBUTARY LOADS                           00000066
        ***** FACTORS TO ADJUST INFLOW LOADINGS *****                                   00000067
     ***************  CONSTANT WASTE LOADINGS  ***************                        00000068
                    END OF CONSTANT WASTEWATER INPUTS                                   00000069
                END OF CONSTANT WASTEWATER INPUT SECTION                                00000070
 **************     VARYING   WASTE LOADING  PARAMETERS  **************                00000071
  PHILA NE MUN  1.55    1                          55    2 2400    1    3               00000072
      196               -164.5       24.8.                                            00000073
     2204               -164.5        0.0                                           00000074
SECTION 2.4          SPECIFY WATER QUALITY BOUNDARY CONDITIONS                        00000075
  DELAWARE RIVR    1    1                          25    1    1    1                  00000076
 SEAWARD BOUNDARY , NODE 1                        2400   00.                          00000077
 SEAWARD BOUNDARY , NODE 2                        2400   0.                           00000078
UPSTREAM BOUNDARY DISCHARGE                       2400-8850   0.                      00000079
SECTION 2.6          SPECIFY INITIAL WATER QUALITY CONDITIONS                         00000080
**************  FACTORS TO ADJUST INITIAL CONCENTRATIONS  ( NGROUP )  **********00000081
SECTION 2.8   SET ADVECTIVE AND DISPERSIVE TRANSPORT FACTORS                          00000082
FACTORS : KADV,CDIFFK,XCU,XCD,XCEBB                2  1.0 0.33 0.67 0.33            00000083
VARYING LONGITUDINAL DISPERSION (C4):          10.0 25.0 50.0 75.0100.0              00000084
SECTION 3.0  SIMULATE WATER QUALITY CONDITIONS (MAIN QUALITY LOOP)                    00000085
NEW OBSERVED DATA , AUG 2 , HS   TIDE             577                                 00000086
                          MID - CHANNEL DATA                                        00000087
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000088
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000089
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000090
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000091
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000092
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000093
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000094
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000095
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000096
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000097
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000098
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000099
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000100
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000101
NEW OBSERVED DATA , AUG 3 , HS TIDE             600                                 000000102
                                                                                    00000103
                          MID - CHANNEL DATA                                        00000104
    0    0    0 0.05 0.11 0.27 0.33 0.31 0.27 0.23 0.18 0.13 0.09 0.05 0.03 0.02000000105
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000106
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000107
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000108
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000109
    0    0    0 0.05 0.11 0.27 0.33 0.31 0.27 0.23 0.18 0.13 0.09 0.05 0.03 0.02000000110
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000111
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000112
    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000113
```

```
    0                                                                                  00000053
 10000000. 10000000.                                                                   00000054
    WATER TEMPERATURE  :                                  1 2400  27.                  00000055
***** ADJUST CONSTITUENT DECAY RATES *****                                             00000056
FECAL COLIFORM HIGH DECAY                                 1  1.0                       00000057
         1          76      4.0                                                        00000058
FECAL COLIFORM LOW DECAY                                  1  1.0                       00000059
         1          76      0.15                                                       00000060
SECTION 2.3          SPECIFY WASTEWATER AND TRIBUTARY LOADS                           00000061
***** FACTORS TO ADJUST INFLOW LOADINGS *****                                          00000062
***************  CONSTANT WASTE LOADINGS  ***************                              00000063
   21     1     5                                                                      00000064
2 GETTYOIL IND  1.55.0995.0005.0997.0003.0004   -   7.9 17.5 17.5 17.5 17.5 17.500000065
   24     2     5                                                                      00000066
2 ICI  001 IND  1.55.0995.0005.0997.0003.0004   -   2.6   15   15   15   15   1500000067
2 ICI  007 IND  1.55 .995 .005 .997 .003 .004   -   1.0  42.  42.  42.  42.  42.00000068
   25     1     5                                                                      00000069
1 WLMINGTN MUN  1.55 9.95 0.05 9.97 0.03 0.04   - 125.9 40.0 40.0 40.0 40.0 40.000000070
   29     1     5                                                                      00000071
3 CHRISTIN TRIB    1 .075 .025 .075 .025 .025   - 262.0   52   52   52   52   5200000072
   30     1     5                                                                      00000073
3 BRNDYWIN TRIB    1 .075 .025 .075 .025 .025   - 518.0   12   12   12   12   1200000074
   34     2     4                                                                      00000075
2  SUN OIL IND  1.55.0995.0005.0997.0003.0004   -  88.0  16.  16.  16.  16.  16.00000076
2  BP OIL  IND  1.55.0995.0005.0997.0003.0004   -  49.0   19   19   19   19   1900000077
   36     1     4                                                                      00000078
3 CHESTR C TRIB    1 .075 .025 .075 .025 .025   -  83.0   53   53   53   53   5300000079
   40     2     4                                                                      00000080
1  CDCA    MUN  1.55 99.5  0.5 99.7  0.3  0.4   -   9.7 21.0 21.0 21.0 21.0 21.000000081
3 DARBY CR TRIB    1 .075 .025 .075 .025 .025   -  60.0   30   30   30   30   3000000082
   44     1     4                                                                      00000083
1 PHILA SW MUN  1.55 99.5  0.5 99.7  0.3  0.4   - 173.0 23.0 23.0 23.0 23.0 23.000000084
   47     1     4                                                                      00000085
3 SCHULKIL TRIB    1.0075.0025.0075.0025.0025   -2067.0  7.5  7.5  7.5  7.5  7.500000086
   49     2     3                                                                      00000087
1 PHILA SE MUN  1.55 99.5  0.5 99.7  0.3  0.4   - 125.0 58.0 58.0 58.0 58.0 58.000000088
1 CAMDEN M MUN  1.55 99.5  0.5 99.7  0.3  0.4   -  21.9 10.0 10.0 10.0 10.0 10.000000089
   54     2     3                                                                      00000090
1 CAMDEN N MUN  1.55 99.5  0.5 99.7  0.3  0.4   -   3.9 10.0 10.0 10.0 10.0 10.000000091
3 COOPER R TRIB    1 0.75 0.25 0.75 0.25 0.25   -  32.0  21.  21.  21.  21.  21.00000092
   55     1     3                                                                      00000093
1 PHILA NE MUN  1.55 99.5  0.5 99.7  0.3  0.4   - 199.0 30.0 30.0 30.0 30.0 30.000000094
   59     1     2                                                                      00000095
3 PENYPACK TRIB    1 .075 .025 .075 .025 .025   -  40.0   56   56   56   56   5600000096
   61     1     2                                                                      00000097
3 RANCOCAS TRIB    1 .075 .025 .075 .025 .025   - 175.0   12   12   12   12   1200000098
   64     1     2                                                                      00000099
1 BLINGTON MUN  1.55.0995.0005.0997.0003.0004   -   1.2   24   24   24   24   2400000100
   65     1     2                                                                      00000101
3 NSHAMINY TRIB    1 .075 .025 .075 .025 .025   - 160.0  6.6  6.6  6.6  6.6  6.600000102
   66     1     2                                                                      00000103
1  BRISTOL MUN  1.55.0995.0005.0997.0003.0004   -   2.6  80.  80.  80.  80.  80.00000104
   69     1     2                                                                      00000105
1 LW BUCKS MUN  1.55.0995.0005.0997.0003.0004   -   7.9  2.9  2.9  2.9  2.9  2.900000106
   73     1     2                                                                      00000107
1 HAMILTON MUN  1.55.0995.0005.0997.0003.0004   -   9.0   17   17   17   17   1700000108
   75     1     2                                                                      00000109
1  TRENTON MUN  1.55 9.95 0.05 9.97 0.03 0.04   -  19.0  8.0  8.0  8.0  8.0  8.000000110
   76     1     2                                                                      00000111
3 ASUNPINK TRIB    1 0.50 0.50 0.50 0.50 0.50   - 100.0  29.  29.  29.  29.  29.00000112
                   END OF CONSTANT WASTEWATER INPUTS                                  00000113
```

```
0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000114
0    0    0  0.05 0.11 0.27 0.33 0.31 0.27 0.23 0.18 0.13 0.09 0.05 0.03 0.02000000115
0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000116
0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000117
0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000118
0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    000000119
```

is justified when there are no mass transfers associated with the decay. Card 13 allows for one varying wastewater discharge. Card 16 will cause the restart file to be written every 50 cycles, along with a printout of the total mass in the estuary. Cards 22 through 35 request many high and low slack tables, all to be plotted separately (KTABLE=2). High and low slack tables begin when NTAG=4 and 18, respectively. For this simulation period, these correspond to quality cycles (n*25)+2 and (n*25) + 16 (the 2 and 16 are found by subtracting the initial NTAG on Card 8 from NSEBB and NSFLD on Card 6).

Card 40 requests four time plots, a medium density grid, and a plotting range of 1.0 to 0. Slack water tables are to be plotted along with 16 data points each; new observed data will be input after cycle 41. The river mile for each data point is given on Card 47, and the observed data for the first plot on Cards 49 through 63.

Section 2.2 limits the number of constituents to one (Card 66), names it, and flags it as non-conservative (Card 68). Card 69 bases its decay on its own concentration, while Card 70 specifies no special functions. The constituent variability card (74) provides for one rate throughout the estuary with no temperature dependence (THETA=1.0) The rate itself is given on Card 75.

Section 2.3 is limited here to a single varying discharge. Card 82 names the discharge, locates it at junction 55, and specifies two discrete discharges in the total period of 2400 cycles (thus no periodicity within the simulation). The flow adjustment factor of 1.55 allows the specification of discharge in units of MGD. Cards 83 and 84 give the discharge flows and concentations for the study period.

Section 2.4 specifies boundary concentrations of zero, while Section 2.6 specifies initial conditions of zero with a single card (91). Section 2.8 gives calibrated transport factors.

Section 3.0 contains new observed data for each slack water table requested. The input cycle for the next observed data set is provided on each new observed data cover (Cards 148, 165, 182,

etc.). Since data to be plotted by symbol X (i.e. Cards 150 - 154), symbol A (Cards 155 - 160), and symbol O (Cards 160 - 164) are identical, only symbol O will appear. If symbol X is desired, Cards 155 and 160 should contain all zero's.

The restart file is automatically written at the end of each simulation period. If a restart is to be made, then the appropriate JCL must be provided. Example JCL is given in the next chapter.

Table 5-3 illustrates the input data for period 2. Card 8 again gives the initial hydraulic cycle and NTAG, this time 294 and 0. The initial cycle is now 449. CTIME1 (Card 9) and time plot cycles (Cards 31 - 34) correspond to cycle 1 on the first simulation run in the series.

The rest of Sections 2.1, 2.2, and 2.3 are the same or similar to the preceeding run. The varying discharge cycles (Cards 72 - 74) correspond to cycle 1 on the first simulation in the series. Section 2.6 contains no data, since initial conditions for this run are read from the restart file. The varying longitudinal advection factors (Table 5-2, Cards 96 - 145) are also read from the restart file. The same is true for constant waste loads; in this case, none were specified anyway.

5.3 FECAL COLIFORM

During the intensive survey of August, 1975, many samples of fecal coliform were analyzed. A model calibration exercise by the Annapolis Field Office produced reasonable agreement between observed and predicted fecal coliform levels when the population was divided into two groups: a rapidly decaying group comprising 99.5% of the sewage treatment plant discharge population, and a slowly decaying resistant group comprising the remaining 0.5%. Table 5-4 gives the input data used for this simulation.

TABLE 5-4
INPUT DATA FOR FECAL COLIFORM

```
        1         2         3         4         5         6         7         8  CARD
        0         0         0         0         0         0         0         0 NUMBER

SECTION 2.1              SET PROGRAM CONTROL OPTIONS                              00000001
DELAWARE ESTUARY 1-D NETWORK, TRENTON-LISTON POINT, DELAWARE R FLOW = 7880 CFS    00000002
                  SIMULATION PERIOD : AUGUST 1 - 15 , 1975                        00000003
***** SYSTEM INFORMATION FROM DYNAMIC FLOW PROGRAM *****                          00000004
   76    82   150   300     6     1     5     1                                  00000005
NSELD,NSEBH,NDURF,NENDE:                          18     4    11    17          00000006
***** INDEPENDENT CONTROL DATA *****                                             00000007
NRSTRT,INCYC,NOCYC,KZOP,KDCOP,NTAG               168     1  1201     0     2     4 00000008
CTIME1,TSPISE,TSSET :                            0.0   6.0  18.0                00000009
NGROUP:                                            5     5     0     0     0     00000010
LGROUP:                                            0     0     0     0           00000011
MGROUP:                                            0     0     0     0     0     00000012
 VARYING WASTE CONTROL :                                                         00000013
************  PRINTOUT CONTROL PARAMETERS  ***************                      00000014
    0     0     0     0     0     0     0     0                                  00000015
RESTART CONTROL                                 1200   200                      00000016
              SUMMARY OUTPUT CONTROL                                             00000017
SUMARY1                                            2                           00000018
  800   850     1     1                                                          00000019
 1050  1100     1     1                                                          00000020
SUMARY2                                            1                           00000021
  800  1200     1     1                                                          00000022
STATS                                             11                           00000023
   12    24    25    36    43    48    51    55    60    66    76               00000024
            SLACK WATER / PROFILE OUTPUT CONTROL                                 00000025
  800           1     2                                                          00000026
 1064           3     2                                                          00000027
                        END OF PRINT CYCLES                                      00000028
OUTPUT TRANSFORMATION - ADDITION :                 3     0     1     2           00000029
OUTPUT TRANSFORMATION - MULTIPLICATION :           1  1000  1000                00000030
OUTPUT TRANSFORMATION - LOGARITHMS :               3     1     1     1           00000031
                        PLOTTER CONTROL INFORMATION                              00000032
    8     1     0 2400     2   5.0     5.0     5.0                               00000033
   25              1 1200    50     0     0     1                               00000034
   25            800 1200     1     0     0     1                               00000035
   36              1 1200    50     0     0     1                               00000036
   36            800 1200     1     0     0     1                               00000037
   52              1 1200    50     0     0     1                               00000038
   52            800 1200     1     0     0     1                               00000039
   66              1 1200    50     0     0     1                               00000040
   66            800 1200     1     0     0     1                               00000041
CONSTITUENT CHOICE CARD FOR PROFILE PLOTS          1     1     1                 00000042
*****************  OBSERVED DATA FOR PROFILE PLOTS  *****************           00000043
SECTION 2.2          DEFINE WATER QUALITY CONSTITUENTS                          00000044
***** QUALITY COEFFICIENTS *****                                                 00000045
NUMBER OF CONSTITUENTS:                            2     0     0     0           00000046
              CONSTITUENT 1 IS DECAYING FECAL COLIFORM (MPN/100ML)               00000047
              CONSTITUENT 2 IS RESISTANT FECAL COLIFORM (MPN/100ML)              00000048
    1     1                                                                      00000049
 -1.0                                                                            00000050
      -1.0                                                                       00000051
    0                                                                            00000052
```

```
   76     1     1
3 DELAWARE RIVR     1.0075.0025.0075.0025.0025    -7880.0  61.  61.  61.  61.  61.
                     END OF CONSTANT WASTEWATER INPUT SECTION
 *************    VARYING  WASTE LOADING  PARAMETERS  ************
SECTION 2.4          SPECIFY WATER QUALITY BOUNDARY CONDITIONS
  DELAWARE RIVR     1.0075.0025                  25     1     1     1
 SEAWARD BOUNDARY , NODE 1  AUGUST 75          2400 0.33 10.0
 SEAWARD BOUNDARY , NODE 2  AUGUST 75          2400 1.33  2.0
UPSTREAM BOUNDARY DISCHARGE, AUG 75            2400-7880  61.  61.
SECTION 2.6          SPECIFY INITIAL WATER QUALITY CONDITIONS
   76         1          1          1          1          1
**************  FACTORS TO ADJUST INITIAL CONCENTRATIONS  ( NGROUP )  **********
  0.1     1    31  1.0    32    42  10.    43    55  1.0    56    64  0.1    65    76
 0.05     1    31 0.06    32    42  0.5    43    55 0.06    56    64 0.02    57    76
SECTION 2.8   SET ADVECTIVE AND DISPERSIVE TRANSPORT FACTORS
FACTORS : KADV,CDIFFK,XCU,XCD,XCEBB                2  1.0 0.33 0.67 0.33
*********** VARYING ADVECTION FACTORS : N,YCU,YCD  **************
    1                 1.0
    2                 1.0
    3                 1.0
    4                 1.0
    5                 1.0
    6                 1.0
    7                 1.0
    8                 1.0
    9                 .60
   10                 .33
   11                 .20
   12                 1.0
   13                 .20
   14                 .20
   15                 .50
   16                 .50
   17                 .50
   18                 .50
   19                 .50
   20                 .50
   21                 .50
   22                 .50
   23                 .50
   24                 .50
99999
*********** VARYING ADVECTION FACTORS : N,YCEBB  **************
    1
    2
    3
    4
    5
    6
    7
    8
    9
   10
   11
   13
   14
   15
   16
   17
   18
   19
```

```
   20        .10                                                                  00000175
   21                                                                             00000176
   22                                                                             00000177
   23                                                                             00000178
   24        .25                                                                  00000179
99999                                                                            00000180
VARYING LONGITUDINAL DISPERSION (C4):          10.0 25.0 50.0 75.0100.0          00000181
SECTION 3.0  SIMULATE WATER QUALITY CONDITIONS (MAIN QUALITY LOOP)               00000182
```

The standard hydraulic information (discussed in 5.1) applies to this simulation. KDCOP (Card 8) is set at 2 as in 5.2, since there is no mass transfer associated with constituent decay. On Card 10, NGROUP is nonzero and thus will be used in Section 2.6 to modify the initial conditions with groups of factors.

Cards 18 - 22 show increased use of the output summary options, with overlapping periods specified. Slack water tables and plots are standard; in this simulation, high and low slack output begin at n*25 and (n*25)+14 quality cycles, respectively (obtained by subtracting the initial NTAG of 4 from NSEBB and NSFLD).

This simulation employs a more complicated data transformation option than the others. Cards 29 through 31 show that the two simulated fecal coliform constituents are first multiplied by 1000, then added together to form constituent 3, and finally reduced to their base 10 logs. The multiplication step was taken because all input data were scaled down by a factor of 1000 for convenience of input. The constituents are added together to yield whole population numbers. Logs are taken for convenience in plotting the sharply varying numbers and because the population itself it considered log-normally distributed.

Plotter control information is standard, except that no observed data is called for on Card 33. NDACYC is irrelevant since when NDATA=0, NDACYC is automatically set to a large number.

Section 2.2 is set up to provide two non-linked constituents decaying at the spatially constant, temperature independent rate of 4.0/day and 0.15/day.

Section 2.3 lists a set of constant input loads. Liberal use is made of the individual discharge multiplication factors. Card 94, for example, lists an input concentration for all constituents of 30. Multiplication factors for constituents 1 and 2, however, are 99.5 and 0.5. Because constituents 1 and 2 are eventually multiplied by 1000 and added together, the fecal coliform concentration in the N.E. effluent is actually assumed to be (99.5 + 0.5)*1000*30,

or 3,000,000 MPN/100 ml. It may be noted that while the percent resistant population in sewage effluent is assumed to be 0.5%, the percentage in tributary loads is assumed to be 25% (i.e., Card 96). At the decay rates assumed for each population, this represents a 2 - 3 day travel time from the original source.

Section 2.6 illustrates the use of NGROUP to simplify the input of initial conditions when accuracy is not necessary. Card 124 sets all concentrations equal to 1.0 so that, in effect, the five multiplication factors for each constituent (Cards 126 and 127) constitute the initial concentrations. The number of factors was specified for each constituent on Card 10.

5.4 D.O. BUDGET - 1-D NETWORK CALIBRATION

The intensive survey of August 1975 produced data used to calibrate the model dissolved oxygen budget interactions, especially as influenced by high levels of algae. This data and the associated modeling effort is described in detail in AFO TR 62 [9]. Table 5-5 gives the input data used for this simulation.

The standard hydraulic information (discussed in 5.1) applies to this simulation. KDCOP (Card 8) is set at 3, since here mass transfer is associated with constituent decay. Thus in a junction when a given amount of constituent 2 mass decays, for example, that amount is added to constituent 3. If it happens that constituent 2 becomes negative in the process, its mass is set equal to zero. This violates the conservation of mass principle, since more mass is transferred than decays. When KDCOP=3, the amount of extra mass added numerically is tracked, and subtracted from the constituent in the problem junction whenever its concentration rises above zero. The amount of uncorrected mass is printed out by juction at the close of the simulation.

Most of the output options are similar to those discussed for the data sets described above. The slack water plotting options

TABLE 5-5
INPUT DATA FOR DO BUDGET (1-D NETWORK CALIBRATION)

```
         1         2         3         4         5         6         7         8  CARD
         0         0         0         0         0         0         0         0 NUMBER

SECTION 2.1              SET PROGRAM CONTROL OPTIONS                              00000001
DELAWARE ESTUARY 1-D NETWORK, TRENTON-LISTON POINT, DELAWARE R FLOW = 7880 CFS    00000002
                  SIMULATION PERIOD : AUGUST 1 - 15 , 1975                        00000003
***** SYSTEM INFORMATION FROM DYNAMIC FLOW PROGRAM *****                          00000004
   76   82  150  300    6    1    5    1                                         00000005
NSFLD,NSEBB,NOUHF,NENDE:                          18    4   11   17             00000006
***** INDEPENDENT CONTROL DATA *****                                             00000007
NRSTRT,INCYC,NOCYC,KZOP,KDCOP,NTAG               168    1 1201    0    3    4   00000008
CTIME1,TSRISE,TSSET :                            0.0  6.0 18.0                  00000009
NGROUP:                                            3    5    4    6    6       00000010
LGROUP:                                            0    0    0    0            00000011
MGROUP:                                            0    0    0    0    0       00000012
 VARYING WASTE CONTROL :                                                         00000013
************  PRINTOUT CONTROL PARAMETERS  ***************                      00000014
    0    0    0    0    0    0    0    0    0                                   00000015
RESTART CONTROL                                  850  200                       00000016
              SUMMARY OUTPUT CONTROL                                            00000017
SUMARY1                                            2                           00000018
  800  850     1    1                                                           00000019
 1050 1100     1    1                                                           00000020
SUMARY2                                            1                           00000021
  800 1200     1    1                                                           00000022
STATS                                             11                           00000023
   12   24   25   36   43   48   51   55   60   66   76                        00000024
            SLACK WATER / PROFILE OUTPUT CONTROL                                00000025
  800          1    3                                                          00000026
  825          1    4                                                          00000027
 1064          3    3                                                          00000028
 1089          3    4                                                          00000029
                    END OF PRINT CYCLES                                         00000030
OUTPUT TRANSFORMATION - ADDITION :                                              00000031
OUTPUT TRANSFORMATION - MULTIPLICATION :                                        00000032
OUTPUT TRANSFORMATION - LOGARITHMS :                                            00000033
                    PLOTTER CONTROL INFORMATION                                 00000034
    8    1   16  900    2  2.5      2.5      2.5      5.0      10.0             00000035
   25             1 1200   50    0    1    1    1    1                         00000036
   25           800 1200    1    0    0    0    0    1                         00000037
   36             1 1200   50    0    1    0    1    1                         00000038
   36           800 1200    1    0    0    0    0    1                         00000039
   52             1 1200   50    0    1    0    1    1                         00000040
   52           800 1200    1    0    0    0    0    1                         00000041
   66             1 1200   50    0    1    0    1    1                         00000042
   66           800 1200    1    0    0    0    0    1                         00000043
CONSTITUENT CHOICE CARD FOR PROFILE PLOTS          1    1    1    1    1        00000044
***************  OBSERVED DATA FOR PROFILE PLOTS  ***************              00000045
  0.5  5.0  9.0 14.0 20.0 24.5 30.0 34.5 38.0 41.5 46.0 49.5 58.5 68.5 76.0 82.000000046
                    MID - CHANNEL DATA                                          00000047
 .44  .50  .40  .46  .46  .62  .50  .62  .56  .66  .52  .62  .68  .52  .52  .2400000048
 .12  .18  .34  .30  .30  .44  .86  .80  .70  .60  .46  .24  .16  .10  .14  .3000000049
1.08 1.08 1.16 1.20 1.38 1.34 1.22 1.26 1.30 1.42 1.56 1.60 1.66 1.68 1.42 1.2600000050
 1.9  2.7  1.6  1.7  1.5  1.5  1.8  1.9  1.7  3.0  2.3  3.1  2.3  2.0  1.7  2.1000000051
 8.9  9.5  7.9  6.8  5.8  4.3  2.2  3.8  1.8  2.8  3.4  5.8  7.8  5.9  5.4  5.2000000052
```

```
  .42  .42  .36  .42  .40  .40  .32  .56  .46  .48  .48  .54  .46  .40  .30  .1800000053
  .08  .08  .18  .24  .20  .28  .54  .56  .58  .52  .34  .08  .06  .04  .10  .2000000054
 1.02 1.04 1.06 1.18  .84  .92  .82  .80  .90  .94 1.06 1.16 1.32 1.44 1.38 1.2400000055
  1.9  2.7  1.6  1.7  1.5  1.4  1.4  1.2  1.6  1.9  2.1  2.8  1.8  1.5  1.5  1.1000000056
  8.6  7.9  7.5  6.1  4.9  3.2  1.5  1.6  1.3  1.6  2.6  3.5  4.0  4.6  5.0  4.9000000057
  .42  .42  .36  .42  .40  .40  .32  .56  .46  .48  .48  .54  .46  .40  .30  .1800000058
  .08  .08  .18  .24  .20  .28  .54  .56  .58  .52  .34  .08  .06  .04  .10  .2000000059
 1.02 1.04 1.06 1.18  .84  .92  .82  .80  .90  .94 1.06 1.16 1.32 1.44 1.38 1.2400000060
  1.9  2.7  1.6  1.7  1.5  1.4  1.4  1.2  1.6  1.9  2.1  2.8  1.8  1.5  1.5  1.1000000061
  8.6  7.9  7.5  6.1  4.9  3.2  1.5  1.6  1.3  1.6  2.6  3.5  4.0  4.6  5.0  4.9000000062
SECTION 2.2          DEFINE WATER QUALITY CONSTITUENTS                        00000063
***** QUALITY COEFFICIENTS *****                                             00000064
NUMBER OF CONSTITUENTS: DEFAULT                    0    0    1    1         00000065
                        CONSTITUENT 1 IS NORG (MG/L)                        00000066
                        CONSTITUENT 2 IS NH3 (MG/L)                         00000067
                        CONSTITUENT 3 IS NO3 (MG/L)                         00000068
                        CONSTITUENT 4 IS CBOD (MG/L)                        00000069
                        CONSTITUENT 5 IS DO (MG/L)                          00000070
   WATER TEMPERATURE  :                        1 2400  27.                  00000071
***** ADJUST CONSTITUENT DECAY RATES *****                                   00000072
NORG: AMMONIFICATION:                                                       00000073
NORG: SETTLING:                                                             00000074
NH3 NITRIFICATION                                                           00000075
NO3 BIOLOGICAL UPTAKE:                                                      00000076
CBOD OXIDATION:                                                             00000077
CBOD SETTLING:                                                              00000078
DO DECAY:                                                                   00000079
REAERATION FORMULA                                                          00000080
 WIND FACTORS                                                               00000081
SEDIMENT OXYGEN DEMAND:                                                     00000082
ALGAL P & R RATES:                                                          00000083
CHLOROPHYLL A:                              5                               00000084
          1        22      25.0                                            00000085
         23        32      75.0                                            00000086
         33        43     125.0                                            00000087
         44        50      50.0                                            00000088
         51        76      12.5                                            00000089
EUPHOTIC DEPTHS:                            5                               00000090
          1        22      5.50                                            00000091
         23        32      8.00                                            00000092
         33        58     10.00                                            00000093
         59        68      8.00                                            00000094
         69        76      9.00                                            00000095
SECTION 2.3          SPECIFY WASTEWATER AND TRIBUTARY LOADS                 00000096
***** FACTORS TO AUJUST INFLOW LOADINGS *****                               00000097
**********  CONSTANT WASTE LOADINGS  **********                             00000098
                                                                            00000099
   14     1     5                                                          00000100
1 SALEMCTY MUN  1.55    1    1    1 1.45    1   -   2.8 2.10 8.50 0.00 48.0  5.3000000100
   17     1     5                                                          00000101
3  SALEM  TRIB    1     1    1    1 1.45    1   -   3.7  .    .    .    5.5   .  00000102
   21     1     5                                                          00000103
2 GETTYOIL IND  1.55    1    1    1 1.90    1   -   9.042.5286.12 8.10 16.3  1.2000000104
   22     1     5                                                          00000105
2  AMOCO   IND  1.55    1    1    1 1.90    1   -   0.6 1.0017.00 0.00134.2   .  00000106
   23     1     5                                                          00000107
1 PENNSVLE MUN  1.55    1    1    1 1.45    1   -   0.912.0029.00 0.00129.7   .  00000108
   24     5     5                                                          00000109
2 DPCHAMBR IND  1.55    1    1    1 1.45    1   -  93.4 3.5012.7023.25 77.6  6.0000000110
2   ICI  1 IND  1.55    1    1    1 1.45    1   -   2.2 1.83 1.44 4.52104.8  4.5000000111
2   ICI  3 IND  1.55    1    1    1 1.45    1   -   1.3 1.17 0.16 2.15 88.0  5.1000000112
2   ICI  4 IND  1.55    1    1    1 1.45    1   -   0.4 0.56 0.27 1.39 58.2  5.9000000113
```

```
2   ICI   7 IND  1.55   1   1   1 1.45   1   -   1.016.8283.18 100.789.0   0.000000114
   25     2     5                                                            00000115
1 UPENSNCK MUN  1.55   1   1   1 1.45   1   -   0.5    .     .     .  128.1    . 00000116
1 WLMINGTN MUN  1.55   1   1   1 1.45   1   -  60.5  6.60  8.90  0.90  44.3  5.200000117
   29     1     5                                                            00000118
3 CHRISTNA TRIB    1   1   1   1 1.45   1   - 230.0  1.00  0.23  1.52   4.5  4.000000119
   30     1     5                                                            00000120
3 BRANDYWN TRIB    1   1   1   1 1.45   1   - 472.7  0.84  0.06  2.09   9.6  8.200000121
   31     2     5                                                            00000122
1 PENSGROV MUN  1.55   1   1   1 1.45   1   -   0.3    .     .     .   25.6    . 00000123
2 UPEDGMOR IND  1.55   1   1   1 1.90   1   -  11.6  2.06  0.41  1.65   4.3    . 00000124
   33     3     5                                                            00000125
3  OLDMANS TRIB    1   1   1   1 1.45   1   -  48.3  1.00  0.14  1.24   3.4  5.000000126
2 ALLDCHEM IND  1.55   1   1   1 1.90   1   -  25.8  1.89  4.64  4.18  15.0  0.600000127
2 PHOENIX  IND  1.55   1   1   1 1.90   1   -  11.0  1.09  2.51  1.97   3.8    . 00000128
   34     8     4                                                            00000129
1 CHESTER  MUN  1.55   1   1   1 1.45   1   -   9.2    .   7.96  1.72  84.2  5.400000130
1 MARCUSHK MUN  1.55   1   1   1 1.45   1   -   0.622.9715.98  2.00 137.7    . 00000131
2  HP 201  IND  1.55   1   1   1 1.90   1   -   2.4    .   1.12  0.90  36.5  2.400000132
2  HP 101  IND  1.55   1   1   1 1.90   1   -  77.0    .   0.20  2.02  11.2  6.900000133
2  HP 002  IND  1.55   1   1   1 1.90   1   -  39.0    .   0.16  1.96  11.7  5.000000134
2   FMC    IND  1.55   1   1   1 1.45   1   -   3.2  0.74  0.74  3.71 140.0    . 00000135
2 MONSANTO IND  1.55   1   1   1 1.90   1   -   1.418.57  1.86  0.003586.    . 00000136
2 SUNOIL 1 IND  1.55   1   1   1 1.90   1   -  88.311.00  2.34  2.24  30.0  5.000000137
   36     4     4                                                            00000138
3  CHESTER TRIB    1   1   1   1 1.45   1   -  82.2  1.07  0.50  2.59   2.3  7.400000139
2 SCOTT  2 IND  1.55   1   1   1 1.90   1   -   4.6    .     .   1.81  91.0  7.100000140
2 SCOTT  3 IND  1.55   1   1   1 1.90   1   -   8.3    .     .   1.88  88.0  8.700000141
2 SCOTT  4 IND  1.55   1   1   1 1.90   1   -   3.5    .     .   1.81  83.0  6.800000142
   38     1     4                                                            00000143
3   RIDLEY TRIB    1   1   1   1 1.45   1   -  10.2  1.07  0.50  2.59   2.3  7.400000144
   39     1     4                                                            00000145
2 UCARBIDE IND  1.55   1   1   1 1.90   1   -   2.6  1.9013.91  3.90  22.4  2.500000146
   40     5     4                                                            00000147
3   DARBY  TRIB    1   1   1   1 1.45   1   -  59.4  1.52  0.80  2.00   2.4  5.200000148
1   CDCA   MUN  1.55   1   1   1 1.45   1   -   9.7  7.3013.93  1.01  37.5  6.900000149
1 URBYCRSA MUN  1.55   1   1   1 1.45   1   -  17.3  0.9810.12  1.76   6.5  7.000000150
1 MUKNPATS MUN  1.55   1   1   1 1.45   1   -   5.7    .     .     .     .    . 00000151
1 TINICUM  MUN  1.55   1   1   1 1.45   1   -                 .     .     .    . 00000152
   42     2     4                                                            00000153
2 UPRPAUNO IND  1.55   1   1   1 1.90   1   -  14.2  1.1037.1015.20  10.8    . 00000154
2 MERCULES IND  1.55   1   1   1 1.90   1   -   0.6    .     .     .   5.1    . 00000155
   43     8     4                                                            00000156
1 GLOSTRCO MUN  1.55   1   1   1 1.45   1   -   6.5    .   3.71  3.71   3.8    . 00000157
1 PAULSBRO MUN  1.55   1   1   1 1.45   1   -   1.3  0.0026.93  0.00  64.0    . 00000158
2 MOBILCP1 IND  1.55   1   1   1 1.90   1   -   7.2  2.90  4.30  0.90  37.4  1.400000159
2 MOBILNY2 IND  1.55   1   1   1 1.90   1   -   4.7  1.25  2.5010.15  14.7  3.800000160
2 MOBILIW3 IND  1.55   1   1   1 1.90   1   -   4.3  0.0029.00  0.00  76.0  0.000000161
2  SHELL   IND  1.55   1   1   1 1.90   1   -   1.919.19  3.71  0.00  29.3    . 00000162
2 OLINCHEM IND  1.55   1   1   1 1.90   1   -  17.4  0.00  2.06  0.00   3.3    . 00000163
3  MANTUA  TRIB    1   1   1   1 1.45   1   -  11.0  0.00  5.06  0.68   4.7    . 00000164
   44     3     4                                                            00000165
1 PHILA SW MUN  1.55   1   1   1 1.45   1   - 173.0  8.30  1.80  0.25  50.0    . 00000166
1 WOODBURY MUN  1.55   1   1   1 1.45   1   -   1.9    .   1.24  0.00  85.4    . 00000167
1 NAT PARK MUN  1.55   1   1   1 1.45   1   -   0.6    .   3.71  0.00  64.0    . 00000168
   45     4     4                                                            00000169
2 GULF OIL IND  1.55   1   1   1 1.90   1   -  10.4  0.00  2.49  1.51   4.1  6.200000170
2 ARCO SPL IND  1.55   1   1   1 1.90   1   -   2.7    .  34.44     .   34.6  7.700000171
2 ARCO NYD IND  1.55   1   1   1 1.90   1   -   1.4    .   0.32  1.15  40.0  2.300000172
2 ARCO WPL IND  1.55   1   1   1 1.90   1   -   0.1    .   3.97  0.49   5.5  4.700000173
   47     1     4                                                            00000174
```

```
3 SCHUYLKL TRIB     1     1     1     1 1.45     1   -2060.0 0.60 0.08 1.98  3.4  6.200000175
                                                                                    00000176
   48     7     4
1 GLOSTRCY MUN   1.55     1     1     1 1.45     1   -    2.5 2.90 15.90 2.07 18.6  . 00000177
1 BELLMAWR MUN   1.55     1     1     1 1.45     1   -        .    .    .    .    .  . 00000178
1 BROKLAWN MUN   1.55     1     1     1 1.45     1   -        .    .    .    .    .  . 00000179
1 MTEPHRAM MUN   1.55     1     1     1 1.45     1   -        .    .    .    .    .  . 00000180
1 NJ ZINC  IND   1.55     1     1     1 1.90     1   -   11.6 2.27 11.76 1.44 32.6  . 00000181
2  NJ ZINC IND   1.55     1     1     1 1.90     1   -    4.5 1.59 10.08 0.80 76.8  . 00000182
2  TEXACO  IND   1.55     1     1     1 1.90     1   -    6.0 4.20 1.05  1.30  1.7  2.700000183
3 HIGTIMBR TRIB     1     1     1     1 1.45     1   -                              00000184
   49     5     3
1 PHILA SE MUN   1.55     1     1     1 1.45     1   - 125.0 7.27 1.58 0.55 120.0  . 00000185
1 CAMDEN M MUN   1.55     1     1     1 1.45     1   - 21.9 15.84 7.05 0.00 226.0  . 00000186
2 MCANDREW IND   1.55     1     1     1 1.45     1   -    1.3    .    .    .  256.1  . 00000187
2 MCANDREW IND   1.55     1     1     1 1.45     1   -    0.6    .    .    .  128.1  . 00000188
2 MARSHOW  IND   1.55     1     1     1 1.45     1   -   11.0 1.86 0.00 0.00  23.0  . 00000189
2  GAF     IND   1.55     1     1     1 1.90     1   -                              00000190
   50     1     3
3 NEWTON   TRIB     1     1     1     1 1.45     1   -    6.0 4.20 1.05 1.30  1.7  2.700000191
                                                                                    00000192
   51     2     3
2 AMSTAR 1 IND   1.55     1     1     1 1.45     1   -   23.6 0.00 0.33 1.67  5.0  6.300000193
2 AMSTAR 3 IND   1.55     1     1     1 1.45     1   -    2.0 0.00 0.37 1.74  6.2  5.400000194
                                                                                    00000195
   52     1     3
2 NATSUGAR IND   1.55     1     1     1 1.45     1   -   15.7 0.00 0.18 1.27  6.6  7.500000196
                                                                                    00000197
   54     2     3
1 CAMDEN N MUN   1.55     1     1     1 1.45     1   -    3.9 6.19 23.52 15.17 92.0  . 00000198
3  COOPER  TRIB     1     1     1     1 1.45     1   -   68.0 0.60 1.76 1.00  5.5  6.700000199
                                                                                    00000200
   55     3     3
1 PHILA NE MUN   1.55     1     1     1 1.45     1   - 199.0 11.60 5.20 0.17 51.0  2.000000201
1 PENSAUKN MUN   1.55     1     1     1 1.45     1   -    3.6 6.17 18.50 4.50 69.3  . 00000202
2 GEORGPAC IND   1.55     1     1     1 1.45     1   -    1.9 1.30 2.30 0.90 222.0  . 00000203
                                                                                    00000204
   56     1     3
3 FRANKFRT TRIB     1     1     1     1 1.45     1   -   10.0 1.00 1.32 2.00  6.9  3.400000205
                                                                                    00000206
   57     2     3                                                                   00000207
1 MTLAUREL MUN   1.55     1     1     1 1.45     1   -                              .
3 PENSAUKN TRIB     1     1     1     1 1.45     1   -   13.6 1.00 1.32 2.00  6.9  3.400000208
                                                                                    00000209
   58     1     3
1 PALMYRA  MUN   1.55     1     1     1 1.45     1   -    0.4 4.90 32.40 3.50 47.6  3.500000210
                                                                                    00000211
   59     2     2
1 CINAMNSN MUN   1.55     1     1     1 1.45     1   -    1.6 4.60 22.00 0.00 30.0  5.000000212
3 PENNPACK TRIB     1     1     1     1 1.45     1   -    5.0 1.00 0.10 3.20  1.0  10.400000213
                                                                                    00000214
   60     1     2
3 POQUESNG TRIB     1     1     1     1 1.45     1   -    5.0 1.00 0.10 3.20  1.0  10.400000215
                                                                                    00000216
   61     2     2
1 WLINGBRO MUN   1.55     1     1     1 1.45     1   -    1.9 1.24 0.00 0.00 38.4  . 00000217
3 MANCOCAS TRIB     1     1     1     1 1.45     1   - 175.0 1.33 0.14 1.24  3.8  4.900000218
                                                                                    00000219
   64     2     2                                                                   00000220
1 BRLINGTN MUN   1.55     1     1     1 1.45     1   -                              .
2 TENNECO  IND   1.55     1     1     1 1.45     1   -    1.3 6.00 18.00 3.10 34.5  3.300000221
                                                                                    00000222
   65     2     2                                                                   00000223
1 FALLSTWP MUN   1.55     1     1     1 1.45     1   -    2.6 14.39 2.32 11.14  9.6  . 00000223
3 NESHAMNY TRIB     1     1     1     1 1.45     1   - 155.4 1.04 0.12 3.00  1.7  8.300000224
                                                                                    00000225
   66     4     2
1 MRSTLBRO MUN   1.55     1     1     1 1.45     1   -    2.1 21.37 6.49 4.60 13.0  6.300000226
1 MRSTLTWP MUN   1.55     1     1     1 1.45     1   -    2.3 3.71    .  1.39  3.2  . 00000227
2 RUHM&HAS IND   1.55     1     1     1 1.45     1   -    1.2 0.98 0.49 0.10 30.0  1.700000228
3 UTH&ASNK TRIB     1     1     1     1 1.45     1   -   10.0    .    .    .  12.3  . 00000229
                                                                                    00000230
   69     4     2
1 LWRHUCKS MUN   1.55     1     1     1 1.45     1   -    8.5 9.29 49.52 0.62 42.7  5.000000231
1 FLORENCE MUN   1.55     1     1     1 1.45     1   -    0.6 3.71 11.14 0.00 64.0  5.000000232
2 PATPARCH IND   1.55     1     1     1 1.45     1   -    3.2 2.29 0.37  0.00 12.8  . 00000233
3 MARTINS  TRIB     1     1     1     1 1.45     1   -    8.5    .    .    .   3.6  . 00000234
                                                                                    00000235
   71     2     2
```

```
2 USSTRMTP IND  1.55    1    1    1 1.45    1   -  32.3 1.74 2.44 1.90  3.4  5.000000236
2 USSRODML IND  1.55    1    1    1  .      1   -    .   .    .    .    .    . 00000237
   72    1    2                                                                 00000238
1 BORDENTN MUN  1.55    1    1    1 1.45    1   -   1.0 3.6014.60 0.00 48.3  5.000000239
   73    2    2                                                                 00000240
1 HAMILTON MUN  1.55    1    1    1 1.45    1   -   9.0 8.0026.6012.00 11.9  5.000000241
3 CROSWICK TRIB    1    1    1    1 1.45    1   -  63. 0 .80 0.14 1.24  3.0  7.000000242
   75    1    2                                                                 00000243
1 TR NTON  MUN  1.55    1    1    1 1.45    1   -  19.3 0.9014.90 0.76 40.0  1.600000244
   76    2    2                                                                 00000245
1 MORRISVL MUN  1.55    1    1    1 1.45    1   -   3.9 1.0031.50 1.81 18.0  7.400000246
3 ASSNPINK TRIB    1    1    1    1 1.45    1   - 102.0 0.80 0.67 2.40  3.0  7.200000247
                  END OF CONSTANT WASTEWATER INPUTS                            00000248
   76    1    1                                                                 00000249
3 DELAWARE RIVR    1    1    1    1 1.45    1   -7880.0 0.41 0.08 1.03  1.5  8.500000250
                  END OF CONSTANT WASTEWATER INPUT SECTION                     00000251
 *************   VARYING  WASTE LOADING  PARAMETERS  ************              00000252
SECTION 2.4          SPECIFY WATER QUALITY BOUNDARY CONDITIONS                 00000253
  DELAWARE RIVR    1    1    1    1 1.45    1   25    1    1    2              00000254
 SEAWARD BOUNDARY . NODE 1  AUGUST 75          2400 0.30 0.30 1.00 1.00 7.00   00000255
 SEAWARD BOUNDARY . NODE 2  AUGUST 75          2400 0.32 0.12 1.40 1.50 5.50   00000256
UPSTREAM BOUNDARY DISCHARGE. AUG 75            850-7880 0.41 0.08 1.03  1.5  8.500000257
UPSTREAM BOUNDARY DISCHARGE. AUG 75           2400-7880 0.41 0.08 1.03  1.5  7.200000258
SECTION 2.6          SPECIFY INITIAL WATER QUALITY CONDITIONS                  00000259
   76    1         1         1         1         1                             00000260
*************  FACTORS TO ADJUST INITIAL CONCENTRATIONS  ( NGROUP )  **********00000261
  0.4    1   23  0.5   24   58  0.4   59   76                                   00000262
  0.1    1   35  0.3   36   42  .65   43   54  0.4   55   58  0.2   59   76    00000263
  1.5    1   19  1.7   20   32  1.4   33   43  1.2   44   76                   00000264
  1.0    1   33  2.0   34   43  3.0   44   51  1.5   52   56  1.0   57   64    00000265
  2.0   65   76                                                                 00000266
  5.0    1   37  3.0   38   43  1.5   44   53  3.0   54   58  5.5   59   69    00000267
  7.5   70   76                                                                 00000268
SECTION 2.8   SET ADVECTIVE AND DISPERSIVE TRANSPORT FACTORS                   00000269
FACTORS : KADV.CDIFFK.XCU.XCD.XCEBB              2  1.0 0.33 0.67 0.33         00000270
*********** VARYING ADVECTION FACTORS : N.YCU.YCD  **************              00000271
    1                 1.0                                                      00000272
    2                 1.0                                                      00000273
    3                 1.0                                                      00000274
    4                 1.0                                                      00000275
    5                 1.0                                                      00000276
    6                 1.0                                                      00000277
    7                 1.0                                                      00000278
    8                 1.0                                                      00000279
    9                 .60                                                      00000280
   10                 .33                                                      00000281
   11                 .20                                                      00000282
   12                 1.0                                                      00000283
   13                 .20                                                      00000284
   14                 .20                                                      00000285
   15                 .50                                                      00000286
   16                 .50                                                      00000287
   17                 .50                                                      00000288
   18                 .50                                                      00000289
   19                 .50                                                      00000290
   20                 .50                                                      00000291
   21                 .50                                                      00000292
   22                 .50                                                      00000293
   23                 .50                                                      00000294
   24                 .50                                                      00000295
99999                                                                           00000296
```

```
*********** VARYING ADVECTION FACTORS : N.YCE88  **************
    1
    2
    3
    4
    5
    6
    7
    8
    9
   10
   11
   13
   14
   15
   16
   17
   18
   19
   20        .10
   21
   22
   23
   24        .25
99999
VARYING LONGITUDINAL DISPERSION (C4):          10.0 25.0 50.0 75.0100.0
SECTION 3.0  SIMULATE WATER QUALITY CONDITIONS (MAIN QUALITY LOOP)
 ** NEW OBSERVED RIVER DATA **                 1250
                          MID - CHANNEL DATA
  .55  .54  .48  .56  .48  .60  .56  .54  .66  .66  .80  .74  .50  .54  .52  .3000000326
  .16  .24  .30  .34  .40  .26  .52  .50  .80  .80  .80  .42  .20  .12  .16  .1800000327
 1.36 1.30 1.20 1.18 1.34 1.58 1.66 1.54 1.44 1.44 1.52 1.64 1.82 1.96 1.88 1.7000000328
  1.7  1.7  1.6  1.4  2.0  2.6  2.6  1.9  2.5  3.0  3.6  4.2  2.5  1.9  1.7  1.800000329
  9.0  7.6  7.2  6.2  5.4  5.1  4.1  3.5  2.3  3.1  5.7  4.4  5.1  6.3  5.8  5.500000330
  .52  .48  .44  .44  .42  .50  .35  .48  .58  .58  .60  .58  .48  .50  .46  .3000000331
  .10  .18  .26  .28  .30  .18  .26  .44  .72  .70  .58  .40  .16  .08  .12  .1600000332
 1.25 1.20 1.14 1.14 1.18 1.38 1.38 1.32 1.24 1.24 1.34 1.40 1.60 1.60 1.70 1.4000000333
  1.6  1.6  1.4  1.4  2.0  1.9  1.9  1.6  2.2  2.4  3.2  3.0  2.2  1.5  1.2  1.200000334
  7.3  7.0  6.8  5.9  5.1  4.8  3.8  2.6  1.6  1.9  2.0  3.2  4.9  5.0  4.7  5.000000335
  .48  .42  .36  .40  .40  .38  .02  .44  .44  .46  .44  .50  .44  .44  .40  .3000000336
  .06  .12  .22  .24  .20  .12  .10  .30  .64  .62  .42  .38  .12  .06  .08  .1000000337
 1.02 1.02  .98 1.02 1.10 1.24 1.32 1.26 1.18 1.16 1.28 1.36 1.50 1.50 1.56 1.3800000338
  1.4  1.4  1.2  1.3  2.0  1.6  1.2  1.4  1.5  2.0  2.2  1.7  1.4  0.9  1.1  1.000000339
  5.0  5.4  6.5  5.4  4.8  4.1  3.6  2.3  0.7  0.7  1.1  2.1  4.7  4.2  4.2  4.600000340
```

in cards 26 to 29 deserve some comment. Constituent 5 in the high water slack table beginning at cycle 800 will be plotted together with constituent 5 in the table beginning at cycle 825 (because of the successive KTABLE values of 3 and 4). These two dissolved oxygen plots correspond to the same tidal conditions 12½ hours apart. CTIME1 on Card 9 was set at 0.0 (midnight) so that cycles 800 and 825 correspond to 4:00 p.m. and 4:30 a.m., respectively (the remainder after dividing 800 and 825 by 48, the number of cycles in a day). Thus the average diurnal DO variation at all points in the estuary is shown on one graph.

The constituent interactions and kinetics for the D.O. budget are considerably more complicated than for the data sets discussed above. Card 65, however, specifies NUMCON=0, which causes default constituent linkage and routes the kinetic input to Reaction Track 2 (default input). Card 65 also specifies NSSAT and NITROP values of 1; these allow supersaturation of D.O. and set the standard nitrification rates and pattern, respectively. The only default inputs which are overridden in this simulation are chlorophyll a (Cards 84 -89) and euphotic depths (Cards 90 - 95).

Section 2.3, specifying wastewater and tributary loads, is lengthy but similar to the data sets discussed above. The adjustment factors for constituent 4 convert the input BOD_5 data to CBOD values. Here, the factors for tributaries and municipal discharges were assumed to be the standard 1.45, while the factors for industrial discharges were set at 1.90. Ideally, individual factors could be determined from studies of each important discharge.

A variation in the upstream boundary discharge of DO is provided for in Section 2.4, Cards 253, 257, and 258. This reflects a change in the DO concentrations measured at Trenton between the first and second weeks of the survey.

In Section 2.6, the initial conditions are blocked off by NGROUP factors (Cards 10, 262 - 268) just as they were in 5.3. Section 2.8

transport factors are standard. New observed data is read in Section 3.0 after cycle 900 (Card 35).

5.5 D.O. BUDGET - 2-D NETWORK QUALITY FORECAST

The intensive survey of July 1976 produced data used to verify the model dissolved oxygen budget interactions. This data and the associated modeling effort is described in AFO TR 62 [9]. This simulation forecasts what the water quality would have been in July, 1976 test had there been no industrial discharges of CBOD at or below Philadelphia. Table 5-6 gives the input data for this simulation.

The hydraulic and network information are standard for 2-D simulations. Since the hydraulic and quality time steps are 90 seconds and 30 minutes, respectively, NODYN (Card 5) is 20. NTAG values are the same as for 1-D runs (1, 2, 3, ..., 24/0, 1, 2, ...); they correspond to hydraulic cycles, 500, 520, 540, ..., 900, 1000/500, 520, ... The initial hydraulic cycle 560 corresponds to NTAG=4 (Card 8), and represents high slack tide at Liston Point. KDCOP is set at 3, for reasons discussed in 5.4.

NGROUP is used to set initial conditions just as in data sets discussed above. Here, the LGROUP and MGROUP options to modify input loads are used for the first time (Cards 11, 12, 85). Since. only LGROUP(2) is nonzero, only type 2 (industrial) discharges will be modified by the MGROUP factors. Furthermore, since only MGROUP(4) is nonzero, only constituent 4 (CBOD) factors will be read in. The value 102 will cause two factors to be read in by river miles; a value of 2 would have caused two factors to be read in by model junctions. The factors on Card 85 will cause no adjustments to industrial CBOD discharges between river miles 1 and 26, but will eliminate these discharges between river miles 26 and 100.

The print and plot control parameters are similar to those discussed in the data sets above. Here, the summary printout will cover 700 cycles, or about 14½ days, and will include two periods of varying environmental conditions. Best (most realistic) results from a forecast can be achieved by extending the simulation, including reasonable variations in major loads and environmental conditions, and by requesting a lengthy summary period. As currently programmed, however, summary tables, plots and statistics cannot be carried through a series of restart runs.

Section 2.2 uses default input for constituent linkage and kinetics, just as in Section 5.4. Two differences are the specification of high nitrification (NITROP=3 on Card 48) and the overriding of default values by river miles rather than by junctions (Cards 67 - 82).

Sections 2.3, 2.4, 2.6, and 2.8 are similar to those sections in the data sets above. Section 3.0 contains new environmental conditions to be read in after cycle 1100 (Card 54). The "new" temperature (Card 329) is actually the same as the old, as are most of the new environmental conditions. The next new temperature and environmental conditions are to be read in after cycle 2400.

TABLE 5-6
INPUT DATA FOR DO BUDGET (2-D NETWORK QUALITY FORECAST)

```
         1         2         3         4         5         6         7         8  CARD
         0         0         0         0         0         0         0         0 NUMBER

SECTION 2.1                SET PROGRAM CONTROL OPTIONS                                  00000001
DELAWARE ESTUARY 2-D NETWORK, TRENTON-LISTON POINT, DELAWARE R FLOW = 7880 CFS          00000002
                  SIMULATION PERIOD : JULY 12 -23, 1976                                 00000003
***** SYSTEM INFORMATION FROM DYNAMIC FLOW PROGRAM *****                               00000004
  156  253  500 1000   20    1    5    2                                               00000005
NSFLO,NSEBB,NDURF,NENDE:                          18    4   11   17                   00000006
***** INDEPENDENT CONTROL DATA *****                                                   00000007
NRSTRT,INCYC,NGCYC,KZOP,KDCOP,NTAG               560    1 1450    0    3    4         00000008
CTIME1,TSRISE,TSSET :                            0.0  6.0 18.0                       00000009
NGROUP :                                           7   15   10   14   16             00000010
LGROUP :                                           0    1    0    0                  00000011
MGROUP:                                            0    0    0  102    0             00000012
VARYING WASTE CONTROL :                                                               00000013
*************  PRINTOUT CONTROL PARAMETERS  ***************                          00000014
    0    1    0    0    0    0    0    1    1                                        00000015
RESTART CONTROL                                  850  200                             00000016
              SUMMARY OUTPUT CONTROL                                                  00000017
SUMARY1                                            0                                  00000018
SUMARY2                                            1                                  00000019
  750 1450    1    1                                                                  00000020
STATS                                              8    1    1    1    1    1        00000021
   12   24   25   61   48  109   79  126                                             00000022
          SLACK WATER / PROFILE OUTPUT CONTROL                                        00000023
 1064         3    3                                                                 00000024
 1089         3    4                                                                 00000025
 1400         1    3                                                                 00000026
 1425         1    4                                                                 00000027
                ENO OF PRINT CYCLES                                                   00000028
OUTPUT TRANSFORMATION - ADDITION :                                                    00000029
OUTPUT TRANSFORMATION - MULTIPLICATION :                                              00000030
OUTPUT TRANSFORMATION - LOGARITHMS :                                                  00000031
                PLOTTER CONTROL INFORMATION                                           00000032
   10    1    0 2400    2  2.5       2.5       2.5       5.0       10.0              00000033
   25         1 1450   50    0    1    0    0    1                                   00000034
   25      1050 1450    1    0    0    0    0    1                                   00000035
   61         1 1450   50    0    0    0    0    1                                   00000036
   61      1050 1450    1    0    0    0    0    1                                   00000037
   48         1 1450   50    0    0    0    0    1                                   00000038
  109         1 1450   50    0    0    0    0    1                                   00000039
   79         1 1450   50    0    1    0    0    1                                   00000040
   79      1050 1450    1    0    0    0    0    1                                   00000041
  126         1 1450   50    0    0    0    0    1                                   00000042
  126      1050 1450    1    0    0    0    0    1                                   00000043
CONSTITUENT CHOICE CARD FOR PROFILE PLOTS          0    1    0    1    1             00000044
*****************  OBSERVED DATA FOR PROFILE PLOTS  ***************                  00000045
SECTION 2.2              DEFINE WATER QUALITY CONSTITUENTS                            00000046
***** QUALITY COEFFICIENTS *****                                                       00000047
NUMBER OF CONSTITUENTS: DEFAULT                    0    0    1    3                  00000048
                        CONSTITUENT 1 IS NORG (MG/L)                                  00000049
                        CONSTITUENT 2 IS NH3 (MG/L)                                   00000050
                        CONSTITUENT 3 IS NO3 (MG/L)                                   00000051
                        CONSTITUENT 4 IS CHOD (MG/L)                                  00000052
```

```
                          CONSTITUENT 5 IS DO (MG/L)                                  00000053
    WATER TEMPERATURE   :                                1 1100  25.                  00000054
***** ADJUST CONSTITUENT DECAY RATES *****                                             00000055
NORG: AMMONIFICATION:                                                                 00000056
NORG: SETTLING:                                                                       00000057
NH3 NITRIFICATION                                                                     00000058
NO3 BIOLOGICAL UPTAKE:                                                                00000059
CBOD OXIDATION:                                                                       00000060
CBOD SETTLING:                                                                        00000061
DO DECAY:                                                                             00000062
REAERATION FORMULA                                                                    00000063
WIND FACTORS                                                                          00000064
SEDIMENT OXYGEN DEMAND:                                                               00000065
ALGAL P & R RATES:                                                                    00000066
CHLOROPHYLL A:                                      107                               00000067
       1.0       12.0       20.0                                                      00000068
      12.0       18.0       40.0                                                      00000069
      18.0       22.0       75.0                                                      00000070
      22.0       27.0      110.0                                                      00000071
      27.0       30.0       75.0                                                      00000072
      30.0       50.0       25.0                                                      00000073
      50.0      100.0       20.0                                                      00000074
EUPHOTIC DEPTHS:                                    107                               00000075
       1.0        3.0       10.0                                                      00000076
       3.0       20.0        7.5                                                      00000077
      20.0       33.0        8.5                                                      00000078
      33.0       48.0       10.0                                                      00000079
      48.0       59.0        8.5                                                      00000080
      59.0       64.0        6.3                                                      00000081
      64.0      100.0        3.5                                                      00000082
SECTION 2.3          SPECIFY WASTEWATER AND TRIBUTARY LOADS                           00000083
***** FACTORS TO ADJUST INFLOW LOADINGS *****                                          00000084
 1.00  1.0 26.0  0.0 26.0 100.                                                        00000085
***************  CONSTANT WASTE LOADINGS  **************                               00000086
   14     1     5                                                                     00000087
1 SALEMCTY MUN  1.55    1    1    1 1.45    1   -   2.8 2.10 8.50 0.00 48.0  5.300000088
   17     1     5                                                                     00000089
3   SALEM  TRIB    1    1    1    1 1.45    1   -   3.7  .    .    .    5.5   . 00000090
   21     1     5                                                                     00000091
2 GETTYOIL IND  1.55    1    1    1 1.90    1   -   8.020.0037.30 0.90 31.0  3.000000092
   22     1     5                                                                     00000093
2  AMOCO   IND  1.55    1    1    1 1.90    1   -   0.6 1.0017.00 0.00134.2   . 00000094
   23     1     5                                                                     00000095
1 PENNSVLE MUN  1.55    1    1    1 1.45    1   -   0.912.0029.00 0.00129.7   . 00000096
   24     5     5                                                                     00000097
2 DPCHAMBR IND  1.55    1    1    1 1.45    1   - 100.0 5.0012.0013.00102.2  4.000000098
2   ICI  1 IND  1.55    1    1    1 1.45    1   -   2.6 1.80 0.20 1.80 31.0  4.000000099
2   ICI  7 IND  1.55    1    1    1 1.45    1   -   1.1 1.50 0.20 2040 24.0  5.000000100
2   ICI  8 IND  1.55    1    1    1 1.45    1   -   0.1 0.70 0.20 1.80 50.0  6.000000101
2   ICI 13 IND  1.55    1    1    1 1.45    1   -   0.921.0072.00 0.90500.0  1.000000102
   25     1     5                                                                     00000103
1 UPENSNCK MUN  1.55    1    1    1 1.45    1   -   0.5  .    .    .  128.1   . 00000104
   26     2     5                                                                     00000105
1 WLMINGTN MUN  1.55    1    1    1 1.45    1   -  70.5 7.0013.00 2.30 16.0  4.000000106
2 DPEDGMOR IND  1.55    1    1    1 1.90    1   -   8.0 1.00 0.30 1.90  4.0  5.000000107
   29     2     5                                                                     00000108
2 PHOENIX  IND  1.55    1    1    1 1.90    1   -  11.0 1.09 2.51 1.97  3.8   . 00000109
2 ALLDCHEM IND  1.55    1    1    1 1.90    1   -  24.4 1.20 1.50 2.00  9.0  2.000000110
   30     6     4                                                                     00000111
1 MARCUSHK MUN  1.55    1    1    1 1.45    1   -   0.622.9715.98 2.00137.7   . 00000112
2 SUNOIL 1 IND  1.55    1    1    1 1.90    1   -  74.0 2.50 2.90 2.80 32.0  3.000000113
```

```
2   FMC      IND  1.55    1    1    1 1.45    1    -    2.5 1.30 0.20 2.80114.0   6.0000000114
2  BP 201    IND  1.55    1    1    1 1.90    1    -    2.2 3.00 3.00 0.50 30.0   4.0000000115
2  BP 101    IND  1.55    1    1    1 1.90    1    -   74.0 1.00 0.30 2.50  7.0   3.0000000116
2  BP 002    IND  1.55    1    1    1 1.90    1    -   38.0 1.00 0.40 2.50  5.0   4.0000000117
    31   1      4                                                                  00000118
1 CHESTER    MUN  1.55    1    1    1 1.45    1    -    8.8 4.8015.60 1.10143.0   1.0000000119
    32   4      4                                                                  00000120
3  CHESTER   TRIB    1    1    1    1 1.45    1    -   40.0 1.00 0.30 6.30  2.7   8.0000000121
2 SCOTT   2  IND  1.55    1    1    1 1.90    1    -    6.7 7.00 0.20 2.40137.0   7.0000000122
2 SCOTT   3  IND  1.55    1    1    1 1.90    1    -    7.5 9.00 0.10 2.00100.0   7.0000000123
2 SCOTT   4  IND  1.55    1    1    1 1.90    1    -    3.9 8.00 0.17 2.20121.0   7.0000000124
    34   1      4                                                                  00000125
2 UCARBIDE   IND  1.55    1    1    1 1.90    1    -    2.6 1.9013.91 3.90 22.4   2.5000000126
    38   1      4                                                                  00000127
1 PHILA SW   MUN  1.55    1    1    1 1.45    1    - 140.0 5.00 6.20 0.61 44.0   4.0000000128
    44   1      3                                                                  00000129
1 PHILA SE   MUN  1.55    1    1    1 1.45    1    - 131.0 6.00 2.10 1.40 89.0   4.0000000130
    45   2      3                                                                  00000131
2 AMSTAR 1   IND  1.55    1    1    1 1.45    1    -    1.9 1.60 0.50 1.60  3.0   3.6000000132
2 AMSTAR 3   IND  1.55    1    1    1 1.45    1    -   23.6 1.20 0.40 1.60  3.3   3.5000000133
    48   1      3                                                                  00000134
2 NATSUGAR   IND  1.55    1    1    1 1.45    1    -   15.8 2.00 0.30 0.70  5.0   2.0000000135
    51   1      3                                                                  00000136
1 PHILA NE   MUN  1.55    1    1    1 1.45    1    - 172.0 8.00 9.90 0.50 65.0   2.6000000137
    56   1      2                                                                  00000138
3 PENYPACK   TRIB    1    1    1    1 1.45    1    -    5.0 1.00 0.10 3.20  1.0  10.4000000139
    89   1      5                                                                  00000140
1 PENSGROV   MUN  1.55    1    1    1 1.45    1    -    0.3  .    .    .   25.6   . 00000141
    91   1      5                                                                  00000142
3  OLDMANS   TRIB    1    1    1    1 1.45    1    -   48.3 1.00 0.14 1.24  3.4   5.0000000143
    93   1      4                                                                  00000144
2 MONSANTO   IND  1.55    1    1    1 1.90    1    -   1.825.0044.00 0.00187.0   1.0000000145
    97   1      4                                                                  00000146
2 DPRPAUNO   IND  1.55    1    1    1 1.90    1    -   15.0 2.00 5.0022.00 31.0,  6.0000000147
    98   1      4                                                                  00000148
2 HURCULES   IND  1.55    1    1    1 1.90    1    -    0.6  .    .    .    5.1   . 00000149
    99   3      4                                                                  00000150
2 MOBILCP1   IND  1.55    1    1    1 1.90    1    -   13.3 2.00 0.00 6.00  8.0   5.0000000151
2 MOBILNY2   IND  1.55    1    1    1 1.90    1    -    4.7 1.25 2.5010.15 14.7   3.8000000152
2 MOBILIW3   IND  1.55    1    1    1 1.90    1    -    4.3 0.0029.00 0.00 76.0   0.0000000153
   100   5      4                                                                  00000154
1 GLOSTRCO   MUN  1.55    1    1    1 1.45    1    -   11.4 2.40 5.70 5.80  9.0   5.0000000155
1 PAULSBRO   MUN  1.55    1    1    1 1.45    1    -    1.3 0.0026.93 0.00 64.0   . 00000156
2  SHELL     IND  1.55    1    1    1 1.90    1    -    1.919.19 3.71 0.00 29.3   . 00000157
2 OLINCHEM   IND  1.55    1    1    1 1.90    1    -   17.4 0.00 2.06 0.00  3.3   . 00000158
3  MANTUA    TRIB    1    1    1    1 1.45    1    -   11.0 0.00 5.06 0.68  4.7   . 00000159
   101   2      4                                                                  00000160
1 WOODBURY   MUN  1.55    1    1    1 1.45    1    -    1.9  .   1.24 0.00 85.4   . 00000161
1 NAT PARK   MUN  1.55    1    1    1 1.45    1    -    0.6  .   3.71 0.00 64.0   . 00000162
   103   1      4                                                                  00000163
2  TEXACO    IND  1.55    1    1    1 1.90    1    -    4.4 1.60 0.00 4.70 10.0   5.0000000164
   104   8      3                                                                  00000165
1 BELLMAWR   MUN  1.55    1    1    1 1.45    1    -                .    .    .    . 00000166
1 BROKLAWN   MUN  1.55    1    1    1 1.45    1    -                .    .    .    . 00000167
1 MTEPHRAM   MUN  1.55    1    1    1 1.45    1    -                .    .    .    . 00000168
1 GLOSTRCY   MUN  1.55    1    1    1 1.45    1    -    3.0 5.0014.00 0.00 54.0   0.0000000169
2 MARSHOW    IND  1.55    1    1    1 1.45    1    -    0.6  .    .    .  128.1   . 00000170
2   GAF      IND  1.55    1    1    1 1.90    1    -   11.0 1.86 0.00 0.00 23.0   . 00000171
2  NJ ZINC   IND  1.55    1    1    1 1.90    1    -    4.0 1.50 0.50 0.00  7.0   2.0000000172
3 BIGTIMBR   TRIB    1    1    1    1 1.45    1    -   70.0 1.80 0.84 1.70  5.0   5.6000000173
   106   2      3                                                                  00000174
```

```
1 CAMDEN M MUN  1.55   1    1    1 1.45   1   -  26.016.0010.00 0.00150.0  1.000000175
2 MCANDAFB IND  1.55   1    1    1 1.45   1   -   1.3  .    .    .  256.1   . 00000176
  113    2    3                                                              00000177
1 PENSAUKN MUN  1.55   1    1    1 1.45   1   -   4.2 7.0017.00 0.00162.0  0.000000178
2 GEORGPAC IND  1.55   1    1    1 1.45   1   -   0.8 6.00 0.10 0.10503.0  1.000000179
  116    1    3                                                              00000180
1 PALMYRA  MUN  1.55   1    1    1 1.45   1   -   0.4 4.9032.40 3.50 47.6  3.500000181
  118    1    2                                                              00000182
1 CINAMNSN MUN  1.55   1    1    1 1.45   1   -   2.0 8.0016.00 0.00 30.0  3.000000183
  125    2    2                                                              00000184
1 BRLINGTN MUN  1.55   1    1    1 1.45   1   -   1.2 9.00 4.00 0.00150.0  0.000000185
2 TENNECO  IND  1.55   1    1    1 1.45   1   -   1.3 6.0018.00 3.10 34.5  3.300000186
  126    1    2                                                              00000187
1 BRSTLTWP MUN  1.55   1    1    1 1.45   1   -   1.712.0015.00 0.80 20.0  2.000000188
  127    3    2                                                              00000189
1 BRSTLBRO MUN  1.55   1    1    1 1.45   1   -   1.7 4.00 8.00 2.80 42.0  7.000000190
2 ROHM&HAS IND  1.55   1    1    1 1.45   1   -   1.0 8.00 0.10 0.40 22.0  5.000000191
3 OTTERCRK TRIB    1   1    1    1 1.45   1   -   5.0  .    .    .   12.3   . 00000192
  128    1    2                                                              00000193
3 ASSISCNK TRIB    1   1    1    1 1.45   1   -   5.0  .    .    .   12.3   . 00000194
  131    4    2                                                              00000195
1 FLORENCE MUN  1.55   1    1    1 1.45   1   -   0.6 3.7111.14 0.00 64.0  5.000000196
1 LWRBUCKS MUN  1.55   1    1    1 1.45   1   -   7.9 5.0020.00 0.50 18.0  3.600000197
2 BRIPARCH IND  1.55   1    1    1 1.45   1   -   3.222.29 0.37 0.00 12.8   . 00000198
3 MARTINS  TRIB    1   1    1    1 1.45   1   -   8.5  .    .    .    3.6   . 00000199
  134    2    2                                                              00000200
2 USSRODML IND  1.55   1    1    1  .     1   -   7.0 1.00 2.80 1.20  2.0  6.000000201
2 USSTRMTP IND  1.55   1    1    1 1.45   1   -  61.3 1.00 2.30 1.50  2.0  5.000000202
  137    1    2                                                              00000203
1 BORDENTN MUN  1.55   1    1    1 1.45   1   -   1.0 3.6014.60 0.00 48.3  5.000000204
  140    1    2                                                              00000205
1 TRENTON  MUN  1.55   1    1    1 1.45   1   -  19.0 6.0045.00 0.00 90.0  1.000000206
  141    2    2                                                              00000207
1 MORRISVL MUN  1.55   1    1    1 1.45   1   -   3.7 1.0031.50 1.81 18.0  7.400000208
3 ASSNPINK TRIB    1   1    1    1 1.45   1   - 102.0 0.80 0.67 2.40  3.0  7.200000209
  145    1    5                                                              00000210
3 CHRISTNA TRIB    1   1    1    1 1.45   1   - 230.0 1.00 0.23 1.52  4.5  4.000000211
  146    1    5                                                              00000212
3 BRANDYWN TRIB    1   1    1    1 1.45   1   - 472.7 0.84 0.06 2.09  9.6  8.200000213
  147    5    4                                                              00000214
1   CDCA   MUN  1.55   1    1    1 1.45   1   -   8.0 2.0020.00 0.80 50.0  3.000000215
1 DRBYCRSA MUN  1.55   1    1    1 1.45   1   -  11.1 3.0021.70 1.90 32.0  3.000000216
1 MUKNPATS MUN  1.55   1    1    1 1.45   1   -   5.0 2.0012.00 5.80 20.0  2.600000217
1 TINICUM  MUN  1.55   1    1    1 1.45   1   -        .    .    .    .    . 00000218
3   DARBY  TRIB    1   1    1    1 1.45   1   -  28.0 1.00 1.20 2.20  3.7  3.000000219
  148    3    4                                                              00000220
2 GULF OIL IND  1.55   1    1    1 1.90   1   -   9.3 2.80 1.9012.00 18.0  4.600000221
2 ARCO SPL IND  1.55   1    1    1 1.90   1   -   3.5 2.40 0.40 3.90  5.0  6.000000222
2 ARCO WPL IND  1.55   1    1    1 1.90   1   -   0.1 2.00 3.00 0.50  8.0  3.000000223
  149    1    4                                                              00000224
2 ARCO NYD IND  1.55   1    1    1 1.90   1   -   2.2 2.00 0.40 0.70 64.0  1.600000225
  150    1    4                                                              00000226
3 SCHUYLKL TRIB    1   1    1    1 1.45   1   -1350.0 0.15 0.04 2.25  2.6  8.000000227
  151    2    3                                                              00000228
1 CAMDEN N MUN  1.55   1    1    1 1.45   1   -   3.212.0025.00 0.00108.0  0.000000229
3  COOPER  TRIB    1   1    1    1 1.45   1   -  44.0 1.80 3.00 1.30  6.0  4.400000230
  152    2    3                                                              00000231
1 MTLAUREL MUN  1.55   1    1    1 1.45   1   -        .    .    .    .    . 00000232
3 PENSAUKN TRIB    1   1    1    1 1.45   1   -  18.0 1.50 2.00 1.70  6.4  3.000000233
  153    2    2                                                              00000234
1 WLINGBRO MUN  1.55   1    1    1 1.45   1   -   1.9 1.24 0.00 0.00 38.4   . 00000235
```

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3 RANCOCAS TRIB     1     1     1     1 1.45     1    - 240.0 1.20 0.20 1.40   3.5  7.000000236
  154     2     2                                                                        00000237
1 FALLSTWP MUN  1.55     1     1     1 1.45     1    -   2.614.39 2.3211.14   9.6   . 00000238
3 NESHAMNY TRIB     1     1     1     1 1.45     1    - 155.4 1.04 0.12 3.00   1.7  8.300000239
  155     2     2                                                                        00000240
1 HAMILTON MUN  1.55     1     1     1 1.45     1    -   8.6 5.0025.00 3.00 18.0  4.000000241
3 CROSWICK TRIB     1     1     1     1 1.45     1    -  63. 0 .80 0.14 1.24   3.0  7.000000242
  156     1     3                                                                        00000243
3  NEWTON  TRIB     1     1     1     1 1.45     1    -   6.0 4.20 1.05 1.30   1.7  2.700000244
                   END OF CONSTANT WASTEWATER INPUTS                                    00000245
  141     1     1                                                                        00000246
3 DELAWARE RIVR     1     1     1     1 1.45     1    -7700.0 0.28 0.07 0.70   2.6  9.300000247
                   END OF CONSTANT WASTEWATER INPUT SECTION                             00000248
 *************    VARYING  WASTE LOADING  PARAMETERS  *************                      00000249
SECTION 2.4          SPECIFY WATER QUALITY BOUNDARY CONDITIONS                           00000250
  DELAWARE RIVR     1     1     1     1 1.45     1    25     1     1     2                00000251
 SEAWARD BOUNDARY . NODE 1  JULY 76              2400 0.30 0.30 1.00 2.00 7.00           00000252
 SEAWARD BOUNDARY . NODE 2  JULY 76              2400 0.20 0.10 1.60 1.50 6.00           00000253
UPSTREAM BOUNDARY DISCHARGE. JUL 76              1100-7880 0.28 0.07 0.70   2.6  9.300000254
UPSTREAM BOUNDARY DISCHARGE. JUL 76              1300-7880 0.28 0.07 0.70   2.6  8.300000255
SECTION 2.6          SPECIFY INITIAL WATER QUALITY CONDITIONS                            00000256
  156         1           1           1           1           1                           00000257
*************  FACTORS TO ADJUST INITIAL CONCENTRATIONS  ( NGROUP )  **********00000258
  0.4     1    23   0.5    24    55   0.4    56    57   0.5    58    86   0.4    87    88   00000259
  0.5    89   117   0.4   118   156                                                        00000260
  0.1     1    30   0.3    31    35  0.65    36    49   0.4    50    55   0.2    56    57   00000261
  0.1    58    61   0.3    62    67  0.65    68    81   0.4    82    86   0.2    87    88   00000262
  0.1    89    93   0.3    94    98  0.65    99   111   0.4   112   117   0.2   118   156   00000263
  1.5     1    13   1.7    14    27   1.4    28    37   1.2    38    57   1.7    58    59   00000264
  1.4    60    69   1.2    70    88   1.7    89    90   1.4    91   100   1.2   101   156   00000265
  1.0     1    29   2.0    30    37   3.0    38    47   1.5    48    52   1.0    53    60   00000266
  2.0    61    69   3.0    70    79   1.5    80    84   1.0    85    92   2.0    93   100   00000267
  3.0   101   108   1.5   109   114   1.0   115   125   2.0   126   156                     00000268
  5.0     1    32   3.0    33    38   1.5    39    49   3.0    50    54   5.5    55    57   00000269
  5.0    58    63   3.0    64    69   1.5    70    80   3.0    81    86   5.5    87    88   00000270
  5.0    89    95   3.0    96   100   1.5   101   111   3.0   112   117   5.5   118   131   00000271
  7.5   132   156                                                                          00000272
SECTION 2.8   SET ADVECTIVE AND DISPERSIVE TRANSPORT FACTORS                              00000273
FACTORS : KADV,CDIFFK,XCU,XCD,XCEBB                 2  1.0 0.20 0.80 0.20                 00000274
*********** VARYING ADVECTION FACTORS : N,YCU,YCU  **************                         00000275
    1                 1.0                                                                  00000276
    2                 1.0                                                                  00000277
    3                 1.0                                                                  00000278
    4                 1.0                                                                  00000279
    5                 1.0                                                                  00000280
    6                 1.0                                                                  00000281
    7                 1.0                                                                  00000282
    8                 1.0                                                                  00000283
    9                 .50                                                                  00000284
   10                 .33                                                                  00000285
   11                 .20                                                                  00000286
   12                 1.0                                                                  00000287
   13                 .20                                                                  00000288
   14                 .20                                                                  00000289
   15                 .50                                                                  00000290
   16                 .50                                                                  00000291
   17                 .50                                                                  00000292
   18                 .50                                                                  00000293
   19                 .50                                                                  00000294
   20                 .50                                                                  00000295
   21                 .50                                                                  00000296
```

```
   22                .50
   23                .50
   24                .50
99999
*********** VARYING ADVECTION FACTORS : N.YCEBB  **************
    1
    2
    3
    4
    5
    6
    7
    8
    9
   10
   11
   12
   13
   14
   15
   16
   17
   18
   19
   20        .10
   21
   22
   23
   24        .25
99999
VARYING LONGITUDINAL DISPERSION (C4):          10.0 25.0 50.0 75.0100.0
SECTION 3.0  SIMULATE WATER QUALITY CONDITIONS (MAIN QUALITY LOOP)
NEW TEMPERATURE                                1101 2400 25.0
NEW NITRIFICATION                                 3
REAERATION FORMULA
WIND FACTORS
SEDIMENT OXYGEN DEMAND:
ALGAL P & R RATES:
CHLOROPHYLL A:                                  104
      1.0       15.0       15.0
     15.0       20.0       45.0
     20.0       25.0       80.0
     25.0      100.0       20.0
EUPHOTIC DEPTHS:                                107
      1.0        3.0       15.0
      3.0       16.0        9.0
     16.0       22.0       12.5
     22.0       37.0       16.0
     37.0       55.0       12.5
     55.0       60.0        7.5
     60.0      100.0        5.0
```

ERROR IN PAGINATION

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CHAPTER 6

COMPUTER REQUIREMENT FOR DYNDELA

6.1 INPUT/OUTPUT DEVICES AND UNIT NUMBERS FOR DYNDELA

Input and output data sets are used for both permanent and temporary storage of information. The input data sets always include the input data itself and a previously calculated hydraulic solution. For a series of consecutive runs, all but the first will include a previously calculated restart file as additional input. Output data sets consist of the printed output requested by the user, temporary work files for constructing output summaries and plots, and a file for storing predicted conditions to be used as input into later restart runs. These data sets are identified and briefly described in Table 6-1.

6.2 JOB CONTROL LANGUAGE (IBM)

Job control language to compile and link edit DYNDELA is straightforward. Sample listings in Table 6-2 illustrates how to compile and link edit from either a catalogued data set or card deck onto a partitioned object library.

Job control language to execute DYNDELA is more involved. It varies depending on whether the simulation (1) stands alone, (2) is the first in a series, or (3) is intermediate or last in a series. Sample listings for these three cases are shown in Tables 6-3, 4, and 5 respectively. Table 6-6 summarizes the attributes of the input and output data sets required for a simulation.

6.3 SIMULATION COSTS

Table 6-7 summarizes the resources necessary for a variety

of simulations with DYNDELA. The 1-D network requires a region size between 406 and 428K, and from 1.2 to 2.6 CPU seconds per constituent per simulated day. On the Washington Computer Center, with overnight priority, this costs from $.44 to $2.25 per constituent per simulated day. Examination of the two DO budget simulations reveals that the 2-D network requires about twice the cpu time and money as the 1-D network, but close to the same region size.

TABLE 6-1
INPUT AND OUTPUT DATA SETS

DATASET	TYPE	DESCRIPTION
FT03F001	OUTPUT	TEMPORARY WORK FILE FOR STORING HYDRODYNAMIC AND NETWORK DATA GENERATED BY DYNHYDRO.
FT04F001	INPUT	PERMANENT FILE ON WHICH HYDRAULIC EXTRACT FROM DYNHYDRO IS STORED. CONTENTS FROM THIS FILE ARE READ ONTO UNIT 3 AT THE BEGINNING OF EACH SIMULATION
FT05F001	INPUT	STANDARD CARD OR CARD IMAGE INPUT.
FT06F001	OUTPUT	STANDARD OUTPUT TO LINE PRINTER.
FT08F001	INPUT	PERMANENT FILE ON WHICH RESTART DATA IS STORED FROM PREVIOUS SIMULATION RUN IN A SERIES.
FT09F001	OUTPUT	PERMANENT FILE ON WHICH RESTART DATA FROM CURRENT SIMULATION RUN IS TO BE STORED.
FT10F001	OUTPUT	TEMPORARY WORK FILE FOR STORING PREDICTED CONCENTRATIONS FROM SPECIFIED TIME PERIODS, TO BE PROCESSED BY SUMARY AND STATS.
FT11F001	OUTPUT	TEMPORARY OR PERMANENT WORK FILE FOR STORING PREDICTED CONCENTRATIONS FOR SPECIFIED JUNCTIONS TO BE PROCESSED BY PLOTER INTO STATION TIME PLOTS.
FT20F001	OUTPUT	TEMPORARY WORK FILE FOR STORING PREDICTED CONCENTRATIONS FROM SPECIFIED TIME PERIODS, TO BE PROCESSED BY SUMARY AND STATS.
FT22F001	OUTPUT	TEMPORARY FILE FOR STORING PLOTS TO BE OUTPUT THROUGH THE LINE PRINTER AT THE COMPLETION OF THE SIMULATION.

TABLE 6-2
SAMPLE JCL TO COMPILE AND LINK EDIT DYNDELA TO OBJECT LIBRARY

A. FROM CATALOGUED DATA SET

```
//EPAXXX   JOB (ACCT,INL,N,DEL,H,,6),'NAME',REGION=300K,
//             TIME=3,MSGLEVEL=(1,1)
/*MESSAGE   DISK XXXXXX
// EXEC FTGICL,TIME=3,REGION=300K
//FORT.SYSIN DD DSN=CN.EPAINL.ACCT.DYNDELA,DISP=(OLD,KEEP),
//           DCH=(LRECL=80,BLKSIZE=400,RECFM=FB),SPACE=(TRK,(30,1))
//LKED.SYSLMOD DD UNIT=3330-1,DISP=SHR,VOL=SER=XXXXXX,
//           DSN=CNACCT.INL.LIBNAME(DYNDELA)
```

B. FROM CARD DECK

```
//EPAXXX   JOB (ACCT,INL,N,DEL,H,,6),'NAME',REGION=300K,
//             TIME=3,MSGLEVEL=(1,1)
/*MESSAGE   DISK XXXXXX
// EXEC FTGICL,TIME=3,REGION=300K
//FORT.SYSIN DD *
  ( CARD DECK OF DYNDELA GOES HERE )
/*
//LKED.SYSLMOD DD UNIT=3330-1,DISP=SHR,VOL=SER=XXXXXX,
//           DSN=CNACCT.INL.LIBNAME(DYNDELA)
```

TABLE 6-3
SAMPLE JCL FOR INDEPENDENT SIMULATION RUN

```
//EPAXXX   JOB (ACCT,INL,N,DEL,B,,6),'NAME',REGION=465K,
//             TIME=5,MSGLEVEL=(1,1),MSGCLASS=P
/*MESSAGE EP5231,R
//STEP1 EXEC PGM=DYNDELA
//STEPLIB DD UNIT=3330-1,DISP=SHR,VOL=(PRIVATE,RETAIN,SER=XXXXXX),
//           DSN=CNACCT.INL.LIBNAME
//           DD DSN=SYS2.FTGILINK,DISP=SHR
//GO.FT04F001 DD DSN=LEOTAPE,DCB=(RECFM=VS,LRECL=504,BLKSIZE=5040),
//           DISP=(OLD,KEEP,KEEP),VOL=SER=EP5231,UNIT=2400,
//           LABEL=(4,SL,EXPDT=98000)
//GO.FT03F001 DD DCB=(RECFM=VBS,LRECL=504,BLKSIZE=5040),UNIT=SYSDA,
//           SPACE=(TRK,(40,40)),DISP=(NEW,DELETE,DELETE),DSN=&&AB
//GO.FT10F001 DD DCB=(RECFM=VBS,LRECL=504,BLKSIZE=5040),
//           UNIT=3330-1,VOL=SER=WORK51,SPACE=(TRK,(10,5),RLSE),
//           DISP=(NEW,DELETE,DELETE),DSN=CNSUM1
//GO.FT09F001 DD DCB=(RECFM=VBS,LRECL=504,BLKSIZE=5040),UNIT=SYSDA,
//           SPACE=(TRK,(40,40)),DISP=(NEW,DELETE,DELETE),DSN=&&APU
//GO.FT08F001 DD DUMMY
//GO.FT11F001 DD DCB=(RECFM=VBS,LRECL=504,BLKSIZE=5040),
//           UNIT=3330-1,VOL=SER=WORK51,SPACE=(TRK,(10,5),RLSE),
//           DISP=(NEW,DELETE,DELETE),DSN=CN.EPAINL.ACCT.TPLOT
//GO.FT20F001 DD DCB=(RECFM=VBS,LRECL=504,BLKSIZE=5040),
//           UNIT=3330-1,VOL=SER=WORK51,SPACE=(TRK,(10,5),RLSE),
//           DISP=(NEW,DELETE,DELETE),DSN=CNSUM2
//GO.FT22F001 DD SYSOUT=A,DCB=RECFM=FBA
//GO.FT06F001 DD SYSOUT=A
//GO.FT05F001 DD *
```

TABLE 6 -4
SAMPLE JCL FOR INITIAL SIMULATION RUN IN SERIES

```
//EPAXXX   JOB (ACCT,INL,N,DEL,B,,6),'NAME',REGION=465K,
//             TIME=5,MSGLEVEL=(1,1),MSGCLASS=P
/*MESSAGE EP5231,R
//STEP1 EXEC PGM=DYNDELA
//STEPLIB DD UNIT=3330-1,DISP=SHR,VOL=(PRIVATE,RETAIN,SER=XXXXXX),
//           DSN=CNACCT.INL.LIBNAME
//            DD DSN=SYS2.PTGILINK,DISP=SHR
//GO.FT04F001 DD DSN=LEOTAPE,DCB=(RECFM=VS,LRECL=504,BLKSIZE=5040),
//           DISP=(OLD,KEEP,KEEP),VOL=SER=EP5231,UNIT=2400,
//           LABEL=(4,SL,EXPDT=98000)
//GO.FT03F001 DD DCB=(RECFM=VBS,LRECL=504,BLKSIZE=5040),UNIT=SYSDA,
//           SPACE=(TRK,(40,40)),DISP=(NEW,DELETE,DELETE),DSN=&&AB
//GO.FT10F001 DD DCB=(RECFM=VBS,LRECL=504,BLKSIZE=5040),
//           UNIT=3330-1,VOL=SER=WORK51,SPACE=(TRK,(10,5),RLSE),
//           DISP=(NEW,DELETE,DELETE),DSN=CNSUM1
//GO.FT09F001 DD DCB=(RECFM=VBS,LRECL=504,BLKSIZE=5040),UNIT=3330-1,
//           VOL=SER=WORK51,SPACE=(TRK,(40,40)),DISP=(NEW,CATLG,CATLG),
//           DSN=CN.EPAINL.ACCT.JY3174
//GO.FT08F001 DD DUMMY
//GO.FT11F001 DD DCB=(RECFM=VBS,LRECL=504,BLKSIZE=5040),
//           UNIT=3330-1,VOL=SER=WORK51,SPACE=(TRK,(10,5)),
//           DISP=(NEW,CATLG,CATLG),DSN=CN.INL.ACCT.DYEIPLT
//GO.FT20F001 DD DCB=(RECFM=VBS,LRECL=504,BLKSIZE=5040),
//           UNIT=3330-1,VOL=SER=WORK51,SPACE=(TRK,(10,5),RLSE),
//           DISP=(NEW,DELETE,DELETE),DSN=CNSUM2
//GO.FT22F001 DD SYSOUT=A,DCB=RECFM=FBA
//GO.FT06F001 DD SYSOUT=A
//GO.FT05F001 DD *
```

TABLE 6-5
SAMPLE JCL FOR INTERMEDIATE SIMULATION RUN IN SERIES

```
//EPAXXX   JOB (ACCT,INL,4,DEL,8,,6),'NAME',REGION=465K,
//             TIME=5,MSGLEVEL=(1,1),MSGCLASS=P
/*MESSAGE EP5231.R
//STEP1 EXEC PGM=DYNDELA
//STEPLIB DD UNIT=3330-1,DISP=SHR,VOL=(PRIVATE,RETAIN,SER=XXXXXX),
//           DSN=CNACCT.INL.LIBNAME
//            DD DSN=SYS2.FTGILINK,DISP=SHR
//GO.FT04F001 DD DCB=(RECFM=VS,LRECL=504,BLKSIZE=5040),
//           DISP=(OLD,KEEP,KEEP),UNIT=3330-1,SPACE=(TRK,(40,40)),
//           DSN=CN.EPAINL.ACCT.HB850
//GO.FT05F001 DD DCB=(RECFM=VBS,LRECL=504,BLKSIZE=5040),UNIT=SYSDA,
//           SPACE=(TRK,(40,40)),DISP=(NEW,DELETE,DELETE),DSN=&&AB
//GO.FT10F001 DD DCB=(RECFM=VBS,LRECL=504,BLKSIZE=5040),
//           UNIT=3330-1,VOL=SER=WORK51,SPACE=(TRK,(10,5),RLSE),
//           DISP=(NEW,DELETE,DELETE),DSN=CNSUM1
//GO.FT04F001 DD DCB=(RECFM=VBS,LRECL=504,BLKSIZE=5040),UNIT=3330-1,
//           VOL=SER=WORK51,SPACE=(TRK,(40,40)),DISP=(NEW,CATLG,CATLG),
//           DSN=CN.EPAINL.ACCT.AUG274
//GO.FT08F001 DD DCB=(RECFM=VBS,LRECL=504,BLKSIZE=5040),UNIT=3330-1,
//           SPACE=(TRK,(40,40)),DISP=(OLD,KEEP,KEEP),
//           DSN=CN.EPAINL.ACCT.JY3174
//GO.FT11F001 DD DCB=(RECFM=VBS,LRECL=504,BLKSIZE=5040),
//           UNIT=3330-1,SPACE=(TRK,(10,5)),
//           DISP=(OLD,KEEP,KEEP),DSN=CN.INL.ACCT.DYE1PLT
//GO.FT20F001 DD DCB=(RECFM=VBS,LRECL=504,BLKSIZE=5040),
//           UNIT=3330-1,VOL=SER=WORK51,SPACE=(TRK,(10,5),RLSE),
//           DISP=(NEW,DELETE,DELETE),DSN=CNSUM2
//GO.FT22F001 DD SYSOUT=A,DCB=RECFM=FMA
//GO.FT06F001 DD SYSOUT=A
//GO.FT05F001 DD *
```

TABLE 6 -6
FILE ATTRIBUTES ON IBM 370

DATASET	NAME	UNIT	VOLUME SERIAL NUMBER	RECORD FORMAT	LOGICAL RECORD LENGTH	BLOCK SIZE	SPACE	DISPOSITION	TYPE OF RUN
FT03F001	&&AH	SYSDA	-	VBS	504	5040	TRK,(40,40)	NEW,DELETE	ALL
FT04F001	SPECIF	2400	OSAXXX	VS	504	5040	-	OLD,KEEP	ALL
(OR)	SPECIF	3330-1	WORKXX	VS	504	5040	TRK,(10,5)	OLD,KEEP	ALL
FT08F001	SPECIF	3330-1	-	VBS	504	5040	TRK,(40,40)	OLD,KEEP	3
	DUMMY								1,2
FT09F001	SPECIF	3330-1	WORKXX	VBS	504	5040	TRK,(40,40)	NEW,KEEP	3
	&&APU	SYSDA	-	VBS	504	5040	TRK,(40,40)	NEW,DELETE	1
FT10F001	CNSUM1	3330-1	WORKXX	VBS	504	5040	TRK,(10,5)	NEW,DELETE	ALL
FT11F001	SPECIF	3330-1	WORKXX	VBS	504	5040	TRK,(10,5)	NEW,DELETE	1
FT11F001	SPECIF	3330-1	WORKXX	VBS	504	5040	TRK,(10,5)	NEW,CATLG	2
FT11F001	SPECIF	3330-1	-	VBS	504	5040	TRK,(10,5)	OLD,KEEP	3
FT10F001	CNSUM2	3330-1	WORKXX	VBS	504	5040	TRK,(10,5)	NEW,DELETE	ALL
FT12F001	-	-	-	FBA	-	-	-	-	ALL

1 - INDEPENDENT SIMULATION RUN
2 - FIRST IN CONSECUTIVE SERIES
3 - INTERMEDIATE IN SERIES

TABLE 6-7
SIMULATION COSTS

SIMULATION	NETWORK	NUMBER CONST'S	QUALITY CYCLES	REGION SIZE	CPU-SEC		COST-$	
					TOTAL	/DAY/CONST	TOTAL	/DAY/CONST
DO BUDGET	1-D	5	1200	428	146	1.17	55	0.44
FEC COLI	1-D	2	1200	418	67	1.33	28	0.56
SALINITY	1-D	1	725	416	23	1.52	14	0.93
DYE	1-D	1	448	406	16	1.71	13	1.42
DYE RESTART	1-D	1	149	422	8	2.58	7	2.25
DO BUDGET	2-D	5	1450	418	406	2.78	131	0.87
H2SO4/FESO4	2-D	3	1250	406	298	3.83	116	1.48

APPENDIX

A.1 REGAN LISTING

```
C*****************************************************************************
C                                PROGRAM REGAN
C                         ENVIRONMENTAL PROTECTION AGENCY
C                              ANNAPOLIS FIELD OFFICE
C*****************************************************************************
C        THIS PROGRAM PERFORMS A LEAST SQUARES FIT OF AN EQUATION OF THE
C      FORM
C            Y(T) = A1 + A2*SIN(WT) + A3*SIN(2WT) + A4*SIN(3WT)
C                      + A5*COS(WT) + A6*COS(2WT) + A7*COS(3WT)
C      TO OBSERVED DATA BY SOLVING THE NORMAL EQUATIONS.
C
C*****************************************************************************
C                                   DIMENSIONS
C*****************************************************************************
      DIMENSION  ALPHA(40), A(7), SXX(7,7), SXY(7), T(100), X(7), Y(100)
      REAL MAXRES
C*************************** READ CONTROL DATA ****************************
      READ (5,500) (ALPHA(I), I=1,40)
      READ (5,501) NDATA, NCOEFF, MAXIT, MAXRES, PERIOD, TSHIFT, PSHIFT
C*************************** READ TIDAL INPUT DATA ************************
      READ (5,502) (T(I), Y(I), I=1,NDATA)
      W = 2. * 3.14159 / PERIOD
C*************************** PRINT INPUT DATA ******************************
      WRITE (6,600) (ALPHA(I), I=1,40), NDATA, NCOEFF, PERIOD, W,
     *              MAXIT, MAXRES, TSHIFT, PSHIFT
      WRITE (6,602)
      DO 100 I=1,NDATA
        WRITE (6,604) I, T(I), Y(I)
        T(I) = T(I) + TSHIFT
  100 CONTINUE
C*************************** INITIALIZE ***********************************
      DO 104 K=1,NCOEFF
        DO 102 J=1,NCOEFF
          A(J)      = 0.
          SXY(J)    = 0.
          SXX(K,J)  = 0.
  102   CONTINUE
  104 CONTINUE
C*************************** SET UP NORMAL EQUATIONS ***********************
      NC2 = NCOEFF/2 + 1
      DO 112 I=1,NDATA
        DO 106 J=1,NCOEFF
          FJ1 = FLOAT(J-1)
          FJ2 = FLOAT(J-NC2)
          IF (J.LE.NC2) X(J) = SIN(FJ1*W*T(I) + PSHIFT)
          IF (J.EQ.1)   X(J) = 1.
          IF (J.GT.NC2) X(J) = COS(FJ2*W*T(I) + PSHIFT)
          SXY(J) = SXY(J) + (X(J) * Y(I))
  106   CONTINUE
            DO 110 J=1,NCOEFF
              DO 108 K=1,NCOEFF
                SXX(K,J) = SXX(K,J) + (X(K) * X(J))
  108         CONTINUE
  110       CONTINUE
  112 CONTINUE
C*************************** PRINT NORMAL COEFFICIENTS ************************
      WRITE (6,606)
      DO 114 J=1,NCOEFF
        WRITE (6,608) J, SXY(J), (SXX(K,J), K=1,NCOEFF)
  114 CONTINUE
```

```
C**************************  SOLVE NORMAL EQUATIONS  **************************
      IT = 0
  115 IT = IT + 1
      RESID = 0.
        DO 118 K=1,NCOEFF
          SUM = 0.
            DO 116 J=1,NCOEFF
              IF (J.EQ.K) GO TO 116
              SUM = SUM - (A(J) * SXX(K,J))
  116       CONTINUE
          SUM = (SUM + SXY(K)) / SXX(K,K)
          DEL = ABS(SUM - A(K))
          IF (DEL.GT.RESID) RESID = DEL
          A(K) = SUM
  118   CONTINUE
      IF (IT.GE.MAXIT) GO TO 120
      IF (RESID.GT.MAXRES) GO TO 115
  120 WRITE (6,610) IT, RESID, (A(K), K=1,NCOEFF)
C***************  PRINT OBSERVED, PREDICTED, AND RESIDUAL DATA  ***************
      WRITE (6,612)
      TRES = 0.
        DO 124 I=1,NDATA
          PRED = 0.
            DO 122 J=2,NCOEFF
              FJ1 = FLOAT(J-1)
              FJ2 = FLOAT(J-NC2)
              IF (J.LE.NC2) PRED = PRED + A(J) * SIN(FJ1*WT(I)+ PSHIFT)
              IF (J.GT.NC2) PRED = PRED + A(J) * COS(FJ2*WT(I)+ PSHIFT)
  122       CONTINUE
          PRED = PRED + A(1)
          DIFF = PRED - Y(I)
          TRES = TRES + ABS(DIFF)
          WRITE (6,614) I, T(I), Y(I), PRED, DIFF
  124   CONTINUE
      WRITE (6,616) TRES
C****************************  FORMAT STATEMENTS  ****************************

500   FORMAT (20A4)
501   FORMAT (3I10,4F10.0)
502   FORMAT (8E8.0)
600   FORMAT (1H1////1X,20A4,14X,'ENVIRONMENTAL PROTECTION AGENCY',/1X ,
     *20A4,16X,'LEAST SQUARES CURVE FITTING',///// ,10X,'NUMBER OF DATA
     *POINTS',10X,'NUMBER OF COEFFICIENTS',/17X,'(NDATA)',24X,'(NCOEFF)'
     *//,19X,I3,28X,I3,///// ,10X,'TIDAL PERIOD (HOURS)',11X,'OMEGA (2*P
     *I/PERIOD)',/16X,'(PERIOD)',23X,'(W)',//,17X,F5.2 ,23X,F7.4,///// ,
     *10X,'MAXIMUM NUMBER OF',14X,'MAXIMUM RESIDUAL',/10X,'ITERATIONS AL
     *LOWED',13X,'ALLOWED',//,16X,I4,26X,F6.4,///// ,10X,'TIME SHIFT',21
     *X,'PHASE ANGLE SHIFT',/11X,'(TSHIFT)',26X,'(PSHIFT)',//,12X,F5.2 ,
     *29X,F5.2  )
602   FORMAT (1H1//1X,30(1H*),'   SUMMARY OF INPUT DATA   ',30(1H*),// ,
     *20X,'OBSERVATION NO.',12X,'TIME',12X,'VALUE',/ ,15X,60(1H-)/  )
604   FORMAT (1H ,27X,I3,18X,F5.2,10X,F7.3)
606   FORMAT (1H1/// ,75X,13(1H-),/6X,'|   ----------   |',50X,'SIGMA Y
     *Y(K,J)',/4X,'|   SIGMA XY(J)   |',50X,13(1H-),/3X,'J  |  --------
     *--  |',/6X,'|',17X,'| K =    1',14X,'2',14X,'3',14X,'4',14X,'5'
     *,14X,'6',14X,'7',/6X,'|',17(1H-),'|',105(1H-),/6X,'|',17X,'|' )
608   FORMAT (1H ,1X,I2,2X,'|',4X,F10.6,3X,'|',7(5X,F10.6),/6X,'|',17X,
     *'|' )
610   FORMAT (////50X,30(1H*),/41X,'SOLUTION',/50X,30(1H*),/// ,43X,'NUM
     *BER OF ITERATIONS',10X,'MAXIMUM RESIDUAL',//,51X,I3,24X,F7.6,////,
     *35X,'THE CURVE WHICH BEST FITS THE OBSERVED DATA IS GIVEN BY  ',
     *///,20X,'Y(T)  =  ',F10.6,'  +  ',F10.6,' SIN(WT)  +  ',F10.6,' SI
     *N(2WT)  +  ',F10.6,' SIN(3WT)',//,41X,'+  ',F10.6,' COS(WT)  +  ',
     *F10.6,' COS(2WT)  +  ',F10.6,' COS(3WT)')
612   FORMAT (1H1// ,1X,30(1H*),'   SUMMARY OF OUTPUT DATA   ',30(1H*)//
     *,4X,'OBSERVATION',10X,'TIME',10X,'OBSERVED',10X,'PREDICTED',10X,'R
     *ESIDUAL',/2X ,66(1H-)// )
614   FORMAT (1H ,7X,I3,14X,F5.2,11X,F6.3,11X,F7.4,13X,F7.4)
616   FORMAT (1H ,///5X,'TOTAL RESIDUAL = ',F10.5 )
      STOP
      END
```

A.2 DYNHYD LISTING

```
C*****************************************************************************
C                                PROGRAM DYNHYD
C                         ENVIRONMENTAL PROTECTION AGENCY
C                             ANNAPOLIS FIELD OFFICE
C*****************************************************************************
C          DYNHYD DESCRIBES THE DYNAMIC FLOW OF A 2-DIMENSIONAL ESTUARINE
C      SYSTEM BY OBTAINING AN EXPLICIT SOLUTION TO THE EQUATIONS OF
C      CONTINUITY AND MOMENTUM.  THIS VERSION CAN HANDLE A NETWORK OF UP
C      TO 139 CHANNELS AND 133 JUNCTIONS.
C*****************************************************************************
C                                CONTROL OPTIONS
C*****************************************************************************
C      HYDEXT   = 1.0      CALL SUBROUTINE HYDEX TO CREATE A SUMMARY
C                          HYDRAULIC EXTRACT TAPE, OR NOT.
C*****************************************************************************
      DIMENSION      A1(7, A2(7))
      COMMON /CHAN/ AK(139), AREA(139), AREAT(139), B(139), CLEN(139),
     *              CN(139), NJUNC(139,2), Q(139), R(139), V(139),
     *              VT(139)
      COMMON /JUNC/ AREAS(133), JPRT(133), NCHAN(133,5), QIN(133),
     *              Y(133), YT(133)
      COMMON /MISC/ ALPHA(80), DELT, ICYC, INTPUN, NJ, NC, NCYC, INTRVL,
     *              NOPRT, NCYCC, PERIOD, PUNCYC
      INTEGER HYDEXT, PUNCYC
      REWIND 4
      REWIND 10
C******************************** CONTROL DATA ********************************
      READ (5,500) (ALPHA(I), I=1,40)
      READ (5,500) HEADER
      READ (5,502) NJ, NC, NCYC, DELT, TZERO
      READ (5,504) IPRINT, INTRVL, NOPRT
      READ (5,504) (JPRT(I), I=1,NOPRT)
      READ (5,504) ITAPE, HYDEXT
      READ (5,504) PUNCYC, INTPUN
      WRITE (6,600) (ALPHA(I),I=1,40), NJ, NC, NCYC, DELT, TZERO,
     *              IPRINT, INTRVL, NOPRT, PUNCYC, INTPUN
      IF (HYDEXT.EQ.0) WRITE (6,602)
      IF (HYDEXT.EQ.1) WRITE (6,601) ITAPE
C******************************** JUNCTION DATA ********************************
      READ (5,500) HEADER
      DO 100 J=1,NJ
      READ (5,506) JJ, Y(J), AREAS(J), QIN(J), (NCHAN(J,K), K=1,5)
        YT(J) = Y(J)
        IF (JJ.EQ.J) GO TO 100
          WRITE (6,604) JJ, J
          STOP
  100 CONTINUE
      WRITE (6,606)
      DO 102 J=1,NJ
        WRITE (6,608) J, Y(J), AREAS(J), QIN(J), (NCHAN(J,K), K=1,5)
  102 CONTINUE
C******************************** CHANNEL DATA ********************************
      READ (5,500) HEADER
      DO 104 N=1,NC
        READ (5,508) NN, CLEN(N), B(N), AREA(N), R(N),
     *              CN(N), V(N), (NJUNC(N,K), K=1,2)
        AREA(N) = B(N) * R(N)
        IF (NN.EQ.N) GO TO 104
          WRITE (6,610) NN, N
          STOP
  104 CONTINUE
```

```
      WRITE (6,612)
      DO 106 N=1,NC
        WRITE (6,614) N, CLEN(N), B(N), AREA(N), CN(N),
     *                V(N), R(N), (NJUNC(N,K), K=1,2)
  106 CONTINUE
C********************  SEAWARD BOUNDARY TIDAL CONDITIONS  ************************
      READ (5,500) HEADER
      READ (5,504) NK
      READ (5,510) PERIOD, (A1(I), I=1,NK)
      READ (5,510) PERIOD, (A2(I), I=1,NK)
      WRITE (6,616) PERIOD, A1(1), (A1(I), I=1,7)
      WRITE (6,616) PERIOD, A2(1), (A2(I), I=1,7)
      NS = NK / 2
C****************  CHECK COMPATIBILITY OF CHANNELS AND JUNCTIONS  ****************
      NEXIT = 0
      DO 112 N=1,NC
        DO 110 I=1,2
          J = NJUNC(N,I)
            DO 108 K=1,5
              IF (N.EQ.NCHAN(J,K)) GO TO 110
  108       CONTINUE
          NEXIT = NEXIT + 1
          WRITE (6,618) N, J
  110   CONTINUE
  112 CONTINUE
      DO 118 J=1,NJ
        DO 116 K=1,5
          IF (NCHAN(J,K).EQ.0) GO TO 118
          N = NCHAN(J,K)
            DO 114 I=1,2
              IF (J.EQ.NJUNC(N,I)) GO TO 116
  114       CONTINUE
          NEXIT = NEXIT + 1
          WRITE (6,618) N,J
  116   CONTINUE
  118 CONTINUE
      IF (NEXIT.GT.0) STOP
C******************  STORE CONTROL AND SYSTEM DATA ON UNIT 10  ********************
      WRITE (10) (ALPHA(I), I=1,40), NJ, NC, DEL1,
     *           (CN(N), R(N), B(N), CLEN(N), N=1,NC)
      WRITE (10) (Y(J), AREAS(J), QIN(J), (NCHAN(J,K), K=1,5), J=1,NJ),
     *           (AREA(N), V(N), (NJUNC(N,I), I=1,2), N=1,NC)
C*******************************************************************************
C                                  INITIALIZATION
C*******************************************************************************
      DELT2  = DELT / 2.
      TZERO  = TZERO * 3600.
      PERIOD = PERIOD * 3600.
        W    = 2. * 3.1416 / PERIOD
        G    = 32.1739
      DO 120 N=1,NC
        AK(N) = G * (CN(N)**2 / 2.208196)
        IF (NJUNC(N,1).LT.NJUNC(N,2)) GO TO 120
          KEEP = NJUNC(N,1)
          NJUNC(N,1) = NJUNC(N,2)
          NJUNC(N,2) = KEEP
  120 CONTINUE
C*******************************************************************************
C                                   MAIN LOOP
C*******************************************************************************
      IF (IWRTE.GT.0) GO TO 124
```

```
      DO 122 N=1,NC
        Q(N) = V(N) * AREA(N)
  122 CONTINUE
      WRITE (10) IWRITE, (Y(J), J=1,NJ), (V(N), Q(N), N=1,NC)
  124 T = TZERO
      DO 166 ICYC=1,NCYC
        NCYCC = ICYC
        T2    = T + DELT2
        T     = T + DELT
C************  COMPUTE CHANNEL VELOCITY AND FLOW FOR 1/2 TIME STEP  ************
        DO 126 N=1,NC
          NL   = NJUNC(N,1)
          NH   = NJUNC(N,2)
          R(N) = AREA(N) / B(N)
          AK1  = AK(N) / (R(N)**1.333333)
          DVDX = (1./R(N)) * (((Y(NH) - YT(NH) + Y(NL) - YT(NL))/DELT)
     *             + (V(N) / CLEN(N)) * (Y(NH) - Y(NL)))
          VT(N)= V(N) + DELT2 * ((V(N) * DVDX) - AK1 * V(N)
     *             * ABS(V(N)) - (G / CLEN(N)) * (Y(NH) - Y(NL)))
          Q(N) = VT(N) * AREA(N)
  126   CONTINUE
C******************  COMPUTE JUNCTION HEADS FOR 1/2 TIME STEP  ********************
        YT(1) = A1(1)
        YT(2) = A2(1)
C           ***************** SEAWARD BOUNDARY HEADS ***************
        DO 128 I=1,NS
          FI   = FLOAT(I)
          YT(1) = YT(1) + A1(I+1) * SIN(FI*W*T2) +
     *                    A1(NS+1+I) * COS(FI*W*T2)
          YT(2) = YT(2) + A2(I+1) * SIN(FI*W*T2) +
     *                    A2(NS+1+I) * COS(FI*W*T2)
  128   CONTINUE
C             ******************* JUNCTION HEADS ********************
        DO 136 J=2,NJ
          SUMQ = QIN(J)
          DO 132 K=1,5
            IF (NCHAN(J,K).EQ.0) GO TO 134
            N = NCHAN(J,K)
            IF (J.NE.NJUNC(N,1)) GO TO 130
              SUMQ = SUMQ + Q(N)
              GO TO 132
            SUMQ = SUMQ - Q(N)
  130       CONTINUE
  132     CONTINUE
  134     YT(J) = Y(J) - ((DELT / AREAS(J)) * .5) * SUMQ
  136   CONTINUE
C*****************  COMPUTE CHANNEL C.S. AREA FOR 1/2 TIME STEP  ********************
        DO 138 N=1,NC
          NL = NJUNC(N,1)
          NH = NJUNC(N,2)
          AREAT(N) = AREA(N) + .5*B(N)*(YT(NH)-Y(NH) + YT(NL)-Y(NL))
          R(N)     = AREAT(N) / B(N)
          AK2      = AK(N) / (R(N)**1.333333)
C************  COMPUTE CHANNEL VELOCITY AND FLOW FOR FULL TIME STEP  ************
          DVDX = (1./R(N)) * (((YT(NH)-Y(NH) + YT(NL)-Y(NL))/DELT) +
     *                 (VT(N) / CLEN(N)) * (YT(NH) - YT(NL)))
          V(N) = V(N) + DELT * ((VT(N) * DVDX) -
     *                   AK2 * VT(N) * ABS(V1(N))
     *                 - (G / CLEN(N)) * (YT(NH) - YT(NL)))
          Q(N) = V(N) * AREAT(N)
  138   CONTINUE
C******************  COMPUTE JUNCTION HEADS FOR FULL TIME STEP  ********************
```

```
          Y(1) = A1(1)
          DO 140 I=1,NS
            FI = FLOAT(I)
            Y(1) = Y(1) + A1(I+1) * SIN(FI*W*T)
     *                  + A1(NS+I+1) * COS(FI*W*T)
            Y(2) = Y(2) + A1(I+1) * SIN(FI*W*T)
     *                  + A1(NS+I+1) * COS(FI*W*T)
  140     CONTINUE
          DO 148 J=2,NJ
            SUMQ = QIN(J)
              DO 144 K=1,5
                IF (NCHAN(J,K).EQ.0) GO TO 146
                  N = NCHAN(J,K)
                  IF (J.NE.NJUNC(N,1)) GO TO 142
                    SUMQ = SUMQ + Q(N)
                    GO TO 144
  142               SUMQ = SUMQ - Q(N)
  144           CONTINUE
  146         Y(J) = Y(J) - (DELT / AREAS(J)) * SUMQ
  148     CONTINUE
C************  COMPUTE CHANNEL C.S. AREA FOR FULL TIME STEP  **********************
          DO 150 N=1,NC
            NL = NJUNC(N,1)
            NH = NJUNC(N,2)
            AREA(N) = AREAT(N) + (.5*H(N)*(Y(NH)-YT(NH) + Y(NL)-YT(NL)))
  150     CONTINUE
C*******************************  CHECK VELOCITIES  ********************************
          DO 152 N=1,NC
            IF (ABS(V(N)).LT.20) GO TO 152
              WRITE (6,620) ICYC, N
              WRITE (6,622) (J, Y(J), YT(J), AREA(J), Q(J), J=1,NJ)
              L = NJ+1
              WRITE (6,624) (J, Y(J), YT(J), AREA(J), Q(J), J=L,NC)
              STOP
  152     CONTINUE
C*********************  STORE DATA FOR HYDRAULIC EXTRACTS  ************************
          IF (ICYC.LT.ITAPE) GO TO 154
            WRITE (10) ICYC, (Y(J), J=1,NJ), (V(N), Q(N), N=1,NC)
  154     CONTINUE
C*****************************  HYDRAULIC OUTPUT  ********************************
          IF (ICYC.NE.IPRINT) GO TO 164
            IPRINT = IPRINT + INTPVL
            TIME = T / 3600.
            WRITE (6,626) ICYC, TIME
              DO 162 I=1,NOPPT
                J = JPRT(I)
                WRITE (6,628) J, Y(J)
                  DO 160 K=1,5
                    IF (NCHAN(J,K).EQ.0) GO TO 160
                      N = NCHAN(J,K)
                      IF (J.NE.NJUNC(N,1)) GO TO 156
                        VEL  = V(N)
                        FLOW = Q(N)
                        GO TO 158
  156                   VEL  = -V(N)
                        FLOW = -Q(N)
  158                 WRITE (6,630) N, VEL, FLOW
  160               CONTINUE
  162           CONTINUE
  164     CONTINUE
C*****************************  CHECK FOR RESTART  *******************************
```

```
          IF (ICYC.EQ.PUNCYC) CALL RESTRT
  166 CONTINUE
C*************************** EXIT HYDRAULIC PROGRAM ***************************
      WRITE (6,632) NCYCC
      IF (HYDEXT.EQ.1) CALL HYDEX
C*****************************************************************************
C                                FORMAT STATEMENTS
C*****************************************************************************
500   FORMAT (20A4)
502   FORMAT (3I5,2F5.0)
504   FORMAT (16I5)
506   FORMAT (I5,3F10.0,5I5)
508   FORMAT (I5,2F8.0,F9.0,F7.0,2F8.0,2I5)
510   FORMAT (8F10.0)
600   FORMAT (1H1,///  ,2X,20A4,11X,'ENVIRONMENTAL PROTECTION AGENCY',/,
     *2X,20A4,8X,'DYNAMIC FLOW IN A 2-DIMENSIONAL SYSTEM',////  ,10X,'NU
     *MBER OF      NUMBER OF',/,10X,'JUNCTIONS      CHANNELS',/,13X,'(NJ)'
     *,10X,'(NC)',//,13X,I3,11X,I3,///  ,14X,'NUMBER OF          HYDRAULIC
     * TIME'/10X,'HYDRAULIC CYCLES       STEP, IN SEC.      STARTING TIME'
     *,/15X,'(NCYC)',14X,'(DELT)',11X,'(TZERO)',//16X,I4,16X,F4.1,12X,F5
     *.1,///  ,10X,'PRINTOUT BEGINS       NO. OF CYCLES        NO. OF JUNC
     *TIONS',/,13X,'AT CYCLE          BETWEEN PRINTOUT          PRINTED',/
     *,13X,'(IPRINT)',13X,'(INTRVL)',13X,'(NOPRT)',//,15X,I4,17X,I4,17X,
     *I3,///  ,10X,'RESTART DATA STORED      NO. OF CYCLES BETWEEN',/,15X
     *,'AT CYCLE',11X,'UPDATE OF RESTART DATA',/,15X,'(PUNCYC)',18X,'(IN
     *TPUN)',//,17X,I4,22X,I4,///  ,10X,'IS SUBROUTINE HYDEX          DAT
     *A FOR HYDEX IS',/,16X,'CALLED ?',10X,'STORED BEGINNING AT CYCLE',
     */,10X,'(DOES HYDEXT = 1 ?)',15X,'(ITAPE)',/  )
601   FORMAT (18X,'YES',24X,I4)
602   FORMAT (18X,'NO')
604   FORMAT(40H0JUNCTION DATA CARD OUT OF SEQUENCE. JJ= I4,4H,J= I4)
606   FORMAT (1H1//2X,48(1H*),'   SUMMARY OF JUNCTION DATA    ',50(1H*),/
     *//13X,'JUNCTION      INITIAL HEAD      SURFACE AREA      INPUT - OUTP
     *UT            CHANNELS ENTERING JUNCTION',/,10X,115(1H-),/  )
608   FORMAT (15X,I3,9X,F10.4,5X,F13.0,8X,F7.1,9X,5(4X,I3) )
610   FORMAT(39H0CHANNEL DATA CARD OUT OF SEQUENCE. NN= I4,4H,N= I4)
612   FORMAT (1H1//2X,48(1H*),'   SUMMARY OF CHANNEL DATA    ',50(1H*),//
     */10X,'CHANNEL      LENGTH      WIDTH      C.S. AREA      ROUGHNESS
     * VELOCITY      HYD. RADIUS',10X,'JUNCTIONS AT ENDS',/,8X,115(1H-)/)
614   FORMAT (12X,I3,7X,F6.0,4X,F6.0,5X,F9.1,6X,F6.3,7X,F8.5,8X,F5.1,16X
     *,I3,5X,I3 )
616   FORMAT (1H1////20X,27(1H*),'   TIDAL CONDITIONS AT THE SEAWARD BOU
     *NDARY    ',27(1H*),///,30X,'TIDAL PERIOD IS ',F5.2,' HOURS',//,30X,
     *'MEAN SEA LEVEL IS ',F8.6,' FEET',//,30X,'THE HEAD AT THE SEAWARD
     *BOUNDARY IS GIVEN BY',//,34X,'HEAD = ',F9.6,' + ',F9.6,' SIN(WT) +
     * ',F9.6,' SIN(2WT) + ',F9.6,' SIN(3WT)',/,51X,' + ',F9.6,' COS(WT)
     * + ',F9.6,' COS(2WT) + ',F9.6,' COS(3WT) '     )
618   FORMAT(30H0COMPATIBILITY CHECK. CHANNEL I4,11H, JUNCTION I4)
620   FORMAT(34H0VELOCITY EXCEEDS 20 FPS IN CYCLE I3,10H, CHANNEL I3,
     *23H, EXECUTION TERMINATED.)
622   FORMAT  (52H   NO.        Y            YT           AREA            0//
     *       (I5,F13.6,F13.6,F15.1,F14.2))
624   FORMAT(I5,26X,F15.1,F14.2)
626   FORMAT(1H1///
     *        27H SYSTEM STATUS AFTER CYCLE I4,F12.2,6H HOURS//
     *        54H JUNCTION       HEAD      CHANNEL      VELOCITY       FLOW/
     *        54H  NUMBER        (FT)       NUMBER        (FPS)       (CFS))
628   FORMAT(1H0I5,F13.4)
630   FORMAT (1H I28,F14.5,F12.1)
632   FORMAT(42H0END OF TWO-DIMENSIONAL EXPLICIT PROGRAM. I4,8H CYCLES.)
      STOP
```

```
      END
C*******************************************************************************
C                              SUBROUTINE HYDEX
C*******************************************************************************
      SUBROUTINE HYDEX
      COMMON /CHAN/ AK(139), AREA(139), AREAT(139), B(139), CLEN(139),
     *              CN(139), NJUNC(139,2), Q(139), R(139), V(139),
     *              VT(139)
      COMMON /JUNC/ AREAS(133), JPRT(133), NCHAN(133,5), QIN(133),
     *              Y(133), YT(133)
      COMMON /MISC/ ALPHA(80), DELT, ICYC, INTPUN, NJ, NC, NCYC, INTRVL,
     *              NOPRT, NCYCC, PERIOD, PUNCYC
      DIMENSION  ARAVG(139), ARMAX(139), ARMIN(139), NMAX(139),
     *    NMIN(139), QEXT(139), QMAX(139), QMIN(139), QNET(139),
     *    RANGE(133), VEXT(139), VMAX(139), VMIN(139), YAVG(133),
     *    YMAX(133), YMIN(133), YNEW(133)
      REWIND 4
      REWIND 10
C**********************  READ INDEPENDENT CONTROL DATA  ***************************
      READ (5,500) HEADER
      READ (5,500) (ALPHA(I), I=41,80)
      READ (5,502) NODYN
C**********************  READ DATA FROM HYDRAULIC PROGRAM  ************************
      READ (10) (ALPHA(I), I=1,40), NJ, NC, DELT,
     *          (CN(N), R(N), B(N), CLEN(N), N=1,NC)
      READ (10) (Y(J), AREAS(J), QIN(J), (NCHAN(J,K), K=1,5), J=1,NJ),
     *          (AREA(N), V(N), (NJUNC(N,I), I=1,2), N=1,NC)
      NSTOP  = NCYCC
      NSTART = NCYCC - (PERIOD/DELT)
      DELTQ  = DELT * FLOAT(NODYN) / 3600.
      WRITE (6,600) (ALPHA(I), I=1,80)
      WRITE (6,602) NSTART, NSTOP, DELT, NODYN, DELTQ
C**************************  ALIGN TAPE AT NSTART CYCLE  ************************
  100 READ (10) ICYCTF, (YNEW(J), J=1,NJ), (V(N), Q(N), N=1,NC)
      IF (ICYCTF.NE.NSTART) GO TO 100
C**********************  INITIALIZE TIDAL CYCLE VARIABLES  ************************
      DO 102 N=1,NC
        QNET(N)  = .5 * Q(N)
        VMAX(N)  = V(N)
        VMIN(N)  = V(N)
        QMAX(N)  = Q(N)
        QMIN(N)  = Q(N)
        ARAVG(N) = 0
        ARMAX(N) = 0
        ARMIN(N) = 1000000.
  102 CONTINUE
      DO 104 J=1,NJ
        YMIN(J) = YNEW(J)
        YMAX(J) = YNEW(J)
        NMIN(J) = ICYCTF
        NMAX(J) = ICYCTF
        YAVG(J) = .5 * YNEW(J)
  104 CONTINUE
C********************  INITIALIZE INTER-TIDAL CYCLE VARIABLES  ********************
  106 DO 108 N=1,NC
        QEXT(N) = .5 * Q(N)
        VEXT(N) = .5 * V(N)
  108 CONTINUE
      WRITE (4) ICYCTF, (YNEW(J), J=1,NJ)
C************************  COMPUTE INTER-TIDAL PARAMETERS  ************************
      DO 126 IC=1,NODYN
```

```
      READ (10) ICYCTF, (YNEW(J), J=1,NJ), (V(N), Q(N), N=1,NC)
        DO 118 N=1,NC
C             ********** SUMMATIONS **********
          QEXT(N) = QEXT(N) + Q(N)
          VEXT(N) = VEXT(N) + V(N)
          QNET(N) = QNET(N) + Q(N)
C             ********** CROSS-SECTIONAL AREA **********
          IF (V(N).NE.0.) GO TO 110
            NL = NJUNC(N,1)
            NH = NJUNC(N,2)
            AREA(N) = AREA(N)
     *                + .5 * H(N) * (YNEW(NH)-Y(NH) + YNEW(NL)-Y(NL))
            GO TO 112
  110     AREA(N) = Q(N) / V(N)
  112     ARAVG(N)= ARAVG(N) + AREA(N)
C             ********** MIN AND MAX VELOCITIES **********
          IF (V(N).GT.VMIN(N)) GO TO 113
            VMIN(N) = V(N)
            GO TO 114
  113     IF (V(N).GT.VMAX(N)) VMAX(N) = V(N)
  114 CONTINUE
C             ********** MIN AND MAX C.S. AREAS **********
          IF (AREA(N).GT.ARMIN(N)) GO TO 115
            ARMIN(N) = AREA(N)
            GO TO 116
  115     IF (AREA(N).GT.ARMAX(N)) ARMAX(N) = AREA(N)
  116     CONTINUE
  118   CONTINUE
C             ********** MIN AND MAX HEADS **********
        DO 124 J=1,NJ
          IF (YNEW(J).GT.YMIN(J)) GO TO 120
            YMIN(J) = YNEW(J)
            NMIN(J) = ICYCTF
  120     IF (YNEW(J).LT.YMAX(J)) GO TO 122
            YMAX(J) = YNEW(J)
            NMAX(J) = ICYCTF
  122     CONTINUE
          YAVG(J) = YAVG(J) + YNEW(J)
            Y(J)  = YNEW(J)
  124   CONTINUE
  126 CONTINUE
C     ********** INTER-TIDAL FLOW AND VELOCITY **********
      DO 132 N=1,NC
        QEXT(N) = QEXT(N) - .5 * Q(N)
        QEXT(N) = QEXT(N) / FLOAT(NODYN)
        VEXT(N) = VEXT(N) - .5 * V(N)
        VEXT(N) = VEXT(N) / FLOAT(NODYN)
C             ********** MIN AND MAX FLOW **********
        IF (QEXT(N).GT.QMIN(N)) GO TO 128
          QMIN(N) = QEXT(N)
          GO TO 130
  128   IF (QEXT(N).GT.QMAX(N)) QMAX(N) = QEXT(N)
  130   CONTINUE
  132 CONTINUE
      WRITE (9) (QEXT(N), VEXT(N), N=1,NC)
      IF (ICYCTF.NE.NSTOP) GO TO 106
C*************************** COMPUTE TIDAL SUMMARY **************************
      DO 134 N=1,NC
        QNET(N)  = QNET(N) - .5 * Q(N)
        QNET(N)  = QNET(N) / FLOAT(NSTOP-NSTART)
        ARAVG(N) = ARAVG(N) / FLOAT(NSTOP-NSTART)
```

```
        R(N)    = ARAVG(N) / H(N)
  134 CONTINUE
      DO 136 J=1,NJ
        RANGE(J) = YMAX(J) - YMIN(J)
        YAVG(J)  = YAVG(J) - .5 * YNEW(J)
        YAVG(J)  = YAVG(J) / FLOAT(NSTOP-NSTART)
  136 CONTINUE
C******************** COMPLETE WRITING HYDRAULIC EXTRACT TAPE *********************
      WRITE (4) (QNET(N), N=1,NC)
      WRITE (4) (ALPHA(I), I=1,40), NJ, NC, DEL1,
     *          (CN(N), R(N), H(N), CLEN(N), N=1,NC)
      WRITE (4) (YAVG(J), AREAS(J), QIN(J), (NCHAN(J,K),K=1,5), J=1,NJ),
     *          (ARAVG(N), (NJUNC(N,I), I=1,2), N=1,NC)
C*************************** PRINT TIDAL CYCLE SUMMARY  ***************************
      WRITE (6,604) (N, QNET(N), QMIN(N), QMAX(N), VMIN(N), VMAX(N),
     *               ARMIN(N), ARMAX(N), ARAVG(N), N=1,NC)
      WRITE (6,606) (J, YMIN(J), NMIN(J), YMAX(J), NMAX(J), YAVG(J),
     *               RANGE(J), J=1,NJ)
C************************  CHECK HYDRAULIC EXTRACT TAPE  *************************
      REWIND 4
      K = (NSTOP - NSTART) / NODYN
      WRITE (6,608)
      DO 138 I=1,K
        READ (4) ICYCTE, (YNEW(J), J=1,NJ)
        READ (4) (QEXT(N), VEXT(N), N=1,NC)
        WRITE (6,610) ICYCTE, YNEW(1), YNEW(50), YNEW(30), YNEW(10),
     *                YNEW(114), QEXT(65), QEXT(50), QEXT(30), QEXT(10),
     *                QEXT(1)
  138 CONTINUE
C*******************************************************************************
C                              FORMAT STATEMENTS
C*******************************************************************************
500   FORMAT (20A4)
502   FORMAT (16I5)
600   FORMAT (1H1///
     *  1H 20A4,10X,37H FEDERAL WATER QUALITY ADMINISTRATION/
     *  1H 20A4,10X,32H NET FLOWS AND HYDRAULIC SUMMARY/
     *       1H 20A4/1H 20A4////)
602   FORMAT(38H ******** FROM HYDRAULICS PROGRAM ********      HYDRAULIC
     * CYCLES PER      TIME INTERVAL IN/
     *37H START CYCLE   STOP CYCLE    TIME INTERVAL         QUALITY CYCLE
     *          QUALITY PROGRAM//
     *1H I7,11X,I7,10X,I6,12X,F9.2,7H  HOURS/////)
604   FORMAT(119H                                    * * * * *  FLOW  * * * * *
     *    * *   VELOCITY   * *       * * *  CROSS-SECTIONAL AREA  * * */
     *       118H CHANNEL      NET FLOW          MIN.              MAX.
     *      MIN.          MAX.          MIN.          MAX.          AVE./
     *       119H NUMBER          (CFS)          (CFS)          (CFS)
     *     (FPS)          (FPS)          (SQ. FT)      (SQ. FT)     (SQ. FT)/.
     *1X,120(1H-),/,(1H 15,F15.2,2F16.2,2F13.3,F16.1,F13.1,F12.1))
606   FORMAT (1H1,/// ,1X,50(1H*),'   SUMMARY OF JUNCTION HEADS   ',50(1
     *H*),//// ,14X,'JUNCTION      MINIMUM HEAD      CYCLE  OF      MAXIMUM
     * HEAD      CYCLE OF      AVERAGE HEAD      TIDAL RANGE',/,31X,'(FT)',
     *9X,'OCCURRENCE',9X,'(FT)',9X,'OCCURRENCE',9X,'(FT)',12X,'(FT)',/ ,10
     *X,115(1H-),/,(1H ,16X,I3,11X,F6.2,11X,I4,10X,F6.2,10X,I4,11X,F6.2,
     *10X,F6.2))
608   FORMAT (1H1///10X,30(1H*),'    CHECK HYDRAULIC EXTRACT TAPE    ',
     *30(1H*),///3X,'CYCLE',15X,'HEADS AT JUNCTIONS',36X,'FLOWS IN CHANNE
     *LS',//14X,'1',7X,'50',6X,'30',6X,'10',5X,'114',16X,'65',11X,'50',
     *11X,'30',11X,'10',10X,'1',/,1X,125(1H-),/ )
610   FORMAT (3X,I4,2X,5(3X,F5.2),8X,5(3X,F10.2) )
```

```
      RETURN
      END
C*****************************************************************************
C                                  RESTRT
C*****************************************************************************
      SUBROUTINE RESTRT
      COMMON /CHAN/ AR(139), AREA(139), AREAI(139), B(139), CLEN(139),
     *              CN(139), NJUNC(139,2), Q(139), R(139), V(139),
     *              VT(139)
      COMMON /JUNC/ AREAS(133), JPRT(133), NCHAN(133,5), QIN(133),
     *              Y(133), YT(133)
      COMMON /MISC/ ALPHA(80), DELT, ICYC, INTPUN, NJ, NC, NCYC, INTPVL,
     *              NOPRT, NCYCC, PERIOD, PUNCYC
      IF (ICYC.EQ.NCYC) GO TO 10
C*****************************  WRITE RESTART TAPE  ******************************
        PUNCYC = PUNCYC + INTPUN
        WRITE (4) ICYC, (Y(J), YT(J), J=1,NJ), (V(N), AREA(N), N=1,NC)
        REWIND 4
        GO TO 20
C*****************************  PUNCH RESTART DECK  ******************************
   10 WRITE (8,60) (J, Y(J), AREAS(J), QIN(J),(NCHAN(J,K),K=1,5),J=1,NJ)
      WRITE (8,61) (N, CLEN(N), B(N), AREA(N), R(N),
     *              CN(N), V(N), (NJUNC(N,K),K=1,2),N=1,NC)
   20 TZERO2 = 1 / PERIOD
      NTZERO = TZERO2
      TZERO2 = (T/3600.) - FLOAT(NTZERO) * (PERIOD/3600.)
      WRITE (6,62) ICYC, TZERO2
   30 CONTINUE
C*****************************  PRINT RESTART DATA  ******************************
C                    ****************  JUNCTIONS  ***************
      WRITE (6,63)
      WRITE (6,64) (J, Y(J), AREAS(J), QIN(J),(NCHAN(J,K),K=1,5),J=1,NJ)
C                    ****************  CHANNELS  ****************
      WRITE (6,65)
      WRITE (6,66) (N, CLEN(N), B(N), AREA(N), CN(N), V(N),
     *              R(N), (NJUNC(N,K), K=1,2), N=1,NC)
C*****************************  FORMAT STATEMENTS  *******************************
   60 FORMAT (I5, F10.4, F10.0, F10.2, 5I5)
   61 FORMAT (I5, 2F8.0, F9.1, F7.2, F8.3, F8.5, 2I5)
   62 FORMAT (1H1///5X,'RESTART TAPE WAS LAST WRITTEN AT CYCLE',I4,5X,'
     * IZERO FOR RESTARTING = ',F10.7 )
   63 FORMAT (1H1///
     *        32H  JUNCTION DATA FOR RESTART DECK///)
   64 FORMAT (86H JUNCTION   INITIAL HEAD   SURFACE AREA   INPUT-OUTPUT
     *     CHANNELS ENTERING JUNCTION//(1H ,I6,F15.4,F17.0,F11.2,I12,
     *     4I6))
   65 FORMAT (1H1///
     *        31H  CHANNEL DATA FOR RESTART DECK///)
   66 FORMAT ( 97H CHANNEL   LENGTH   WIDTH     AREA    MANNING   VELOCI
     *TY   HYD RADIUS           JUNCTIONS AT ENDS//
     *(1H I5,F11.0,F8.0,F10.1,F9.3,F10.5,F13.2,       I23,I6))
      RETURN
      END
```

A.3 DYNDELA Listing

```
C                          PROGRAM DYNDELA
C                  ENVIRONMENTAL PROTECTION AGENCY
C                    DYNAMIC WATER QUALITY MODEL
C
C
C
C                              1.0
C              SIMULATE DELAWARE ESTUARY WATER QUALITY
C
C
C
C
C
C
C
C
C
C
C
C
C
C
C
C
C
C
C
C
C
C
C*********************************************************************
C*********************************************************************
C
C                          SECTION 2.0
C
C                  READ AND PREPARE INPUT DATA
C
C*********************************************************************
C*********************************************************************
C
C
C
C*********************************************************************
C                          SECTION 2.1
C                  SET PROGRAM CONTROL OPTIONS
C*********************************************************************
C
C
C**** 2.1.1  OPEN FILES AND ARRAYS
C
      DIMENSION NCV(5),CW(5),CINMAX(5),CINCR(5),CIN1(5),DMASS(5)
      DIMENSION CU(260),CD(260),YNEW(260),VOLQIN(160),AREAS(160),
     1 QNET(260),CEBB(260),VMEAN(260),
     2 VSQRT(260),AREA(260),B(260),CLEN(260),CN(260),R(260)
      DIMENSION FACTR(5,20),NJSTRT(5,20),NJSTOP(5,20),
     1 RMSTRT(5,20),RMSTOP(5,20)
      DIMENSION INCBC1(25),INCBC2(25),VBC1(25,5),VBC2(25,5)
      DIMENSION NJUNC(260,2),CMASS(160,5),DPMASS(160,5)
      DIMENSION IPRT1(10),IPRT2(10),LPRT1(10),LPRT2(10),IPLT1(10),
     1          IPLT2(10),ISTAT1(10),ISTAT2(10)
      COMMON NSPEC,DELTQ,NUMCON,NALPHA,NJ,KZOP,
     1  NTIMES,CTIME1,CTIME,TSRISE,TSSET
      COMMON/MANSTA/NJSTAT,JUNCST(50),ISTAT(5)
      COMMON/DPRINT/KDELP1,KDELP2,KDELP3,KDELPC,KDELP4,KDELP5,KDELP6,
     1  KDELP8,KDELP9
      COMMON/GROUP/MGROUP(6),LGROUP(4),NGROUP(5)
      COMMON/VWLOAD/CON(5,75,35),FLO(75,35),INCF(75,35),NJVD(75),
     1 NINCF(75),NPERF(75),NTYS(75),NZSN(75),KCLF(75),KFK(75)
      COMMON/CINPUT/CSPEC(160,5),QINWQ(160),CRF(6),
     1 WFLO(2,10),WCON(5,10),WLOAD(5,10),DELTQ1
```

```
      COMMON/PAR/CSAT,CDO,REOXK,SODD,PHOTOM,RESPM,CKT,CXT,AMUP,PHUP,DNK  00006200
      COMMON/DISPF/QIN(160),DIFFK(260)                                   00006300
      COMMON/CHAN/V(260),Q(260),NCHAN(160,5)                             00006400
      COMMON/DENITR/DNMAX,DNBRK,DNDOBR,DNSTRT,THETDN                     00006500
      COMMON/STND/JSTAN,YSTAN,KPLOP                                      00006600
      COMMON/STAB/NPC(120),NOPRT(120),KTABLE(120),JPRT(120,30),KSL(120)  00006700
      COMMON/A/GMAX(5),GMIN(5),NGJUNC(20),NGST(20),NGEND(20),            00006800
     1   NGCON(20,5),NGCYC,NBRCON,NGINT(20)                              00006900
      COMMON/B/NDATA,DATA(3,5,16,3),RDATA(16),IMPOSF                     00007000
      COMMON/TRN/C(160,5),Y(160),TRNSC(5),LOGOP(5),DMULT(5),IADOP(5),    00007100
     1          IADDTR(2),IDATRF,IADTRF,MLTTRF,LOGTRF,NUMC               00007200
      COMMON/CWTABL/NZTDIS(6,4),ZTLOAD(5,6,4),ZTPCT(5,6,4),NZDIS(6),     00007300
     1 ZLOAD(5,6),ZPCT(5,6),NDIS,CWLOAD(5),NTYPE,NZ                      00007400
      COMMON/VWTABL/TCZT(6,4),TLKZT(5,6,4),ZCON(5,6,4),TCZ(6),           00007500
     1 TLKZ(5,6),ZCON1(5,6),TCOUNT,TLBS(5),ISAN,ISIN,ININ,IRUN          00007600
      COMMON/ALPH/ALPHA(220),BLANKF(20)                                  00007700
      COMMON/RATES/RATE(160,7),WINDSP(160),WINDOX(160),SOD(160),         00007800
     1  CHLORO(160),PHOTO(160),RESP(160),DEPTHP(160),ADEPTH(160),        00007900
     2  THETA(15),RM(10),RXN(10),DTD,TEMP                                00008000
      COMMON/FUNX/NCONS(5),CO(5,5),FUNC(12,5),CLIMIT(5),NCHLO,NAMM,NPHO,00008100
     1           NAD1,NAD2,NDO,NNO3                                      00008200
      COMMON/WNF/RMNODE(160),FGSWO(99,5),FGSWA(99),IWFSCY,ICYC,IGCF(5),  00008300
     1 KSLACK,IWF,IWFFCY,INODOR(99),NMODE,NODERM(100,3)                  00008400
      COMMON/HORDER/XORDER(5),YORDER(5),RORDER(5)                        00008500
      COMMON/AGEOM/AVOL(160),ASUR(160),VOL(160),VMEANJ(160)              00008600
      EQUIVALENCE (AREAS,ASUR),(QINWO,VOLQIN),(CN,DIFFK),                00008700
     1  (YNEW,AREA)                                                      00008800
      REWIND 3                                                           00008900
      REWIND 4                                                           00009000
      REWIND 8                                                           00009100
      REWIND 09                                                          00009200
      REWIND 10                                                          00009300
C                                                                        00009400
C**** 2.1.2  READ AND MANIPULATE HYDRAULIC AND NETWORK DATA              00009500
C                                                                        00009600
      READ(5,103) (ALPHA(I),I=1,20)                                      00009700
      WRITE(6,8601)                                                      00009800
      WRITE(6,8604) (ALPHA(I),I=1,20)                                    00009900
      WRITE(6,8601)                                                      00010000
      READ(5,103)(ALPHA(I),I=41,80)                                      00010100
      READ(5,103) HEADER                                                 00010200
      READ(5,40)NJ,NC,NSTART,NSTOP,NODYN,NZ1,NZ2,NMODE                   00010300
      READ(5,99892) NSFLD,NSFBB,NDURFL,NENDE                             00010400
      K = (NSTOP-NSTART)/NODYN                                           00010500
      XK = FLOAT(K)                                                      00010600
      DO 6216 L=1,NC                                                     00010700
       VSQRT(L) = 0.0                                                    00010800
       VMEAN(L) = 0.0                                                    00010900
       CD(L) = 0.0                                                       00011000
6216  CONTINUE                                                           00011100
      DO 86 I = 1,K                                                      00011200
       READ(4)      ICYCTF,(YNEW(J),J=1,NJ)                            00011300
       WRITE(3)     ICYCTF,(YNEW(J),J=1,NJ)                            00011400
       READ(4)      (Q(N),V(N),N=1,NC)                                 00011500
       WRITE(3)     (Q(N),V(N),N=1,NC)                                 00011600
       DO 6222 L=1,NC                                                    00011700
        QL = ABS(V(L))                                                   00011800
        VMEAN(L) = VMEAN(L) + QL                                         00011900
        VSQRT(L) = VSQRT(L) + SQRT(QL)                                   00012000
        CD(L) = CD(L) + ABS(Q(L))                                        00012100
6222    CONTINUE                                                         00012200
```

```
86    CONTINUE                                                                00012300
      DO 6224 L=1,NC                                                          00012400
       VMEAN(L) = VMEAN(L) /XK                                                00012500
       VSQRT(L) = VSQRT(L) /XK                                                00012600
       CD(L) = CD(L) /XK                                                      00012700
6224  CONTINUE                                                                00012800
      READ(4)      (QNET(N),N=1,NC)                                           00012900
      READ(4)        (ALPHA(I),I=1,40),NJ,NC,DELT,(CN(N),R(N),B(N),           00013000
     1    CLEN(N),N=1,NC)                                                     00013100
      READ(4)        (Y(J),AREAS(J),QIN(J),(NCHAN(J,K),K=1,5),J=1,NJ),       00013200
     1    (AREA(N),      (NJUNC(N,I),I=1,2),N=1,NC)                          00013300
      REWIND 3                                                                00013400
      REWIND 4                                                                00013500
C*******  FIND THE SQUARE OF THE AVERAGE SQRT VELOCITY BY JUNCTION  ****00013600
      DO 6228 J=1,NJ                                                          00013700
       QK = 0.0                                                               00013800
       QQ = 0.001                                                             00013900
       DO 6226 K=1,5                                                          00014000
        NCH = NCHAN(J,K)                                                      00014100
        IF (NCH.EQ.0) GO TO 6226                                              00014200
        QK = QK + VSQRT(NCH) * CD(NCH)                                        00014300
        QQ = QQ + CD(NCH)                                                     00014400
6226   CONTINUE                                                               00014500
       VMEANJ(J) =(QK/QQ)**2                                                  00014600
6228  CONTINUE                                                                00014700
      DELTQ = DELT * FLOAT(NODYN)                                             00014800
      DELTQ1 = DELTQ / 3600.0                                                 00014900
      DTD = DELTQ1/24.                                                        00015000
C*******  CALCULATE MEAN JUNCTION VOLUMES  *******                           00015100
359   DO 373 J=1,NJ                                                          00015200
       AVOL(J) = 0.0                                                          00015300
       ASUM    = 0.0                                                          00015400
       DSUM    = 0.0                                                          00015500
       DO 371 K=1,5                                                           00015600
        IF(NCHAN(J,K).LE.0) GO TO 372                                         00015700
        N = NCHAN(J,K)                                                        00015800
        ABAR = CLEN(N)*B(N)                                                   00015900
        ASUM = ASUM + ABAR                                                    00016000
        DSUM = DSUM + ABAR*R(N)                                               00016100
371    CONTINUE                                                               00016200
372    DBAR = DSUM/ASUM                                                       00016300
       AVOL(J) = ASUR(J) * DBAR                                               00016400
       TVOL = TVOL + AVOL(J)                                                  00016500
373   CONTINUE                                                                00016600
C                                                                             00016700
C**** 2.1.3  READ INDEPENDENT CONTROL PARAMETERS                              00016800
C                                                                             00016900
      READ(5,103) HEADER                                                      00017000
      READ(5,99892) NRSTRT,INCYC,NQCYC,KZOP,KDCOP,NTAG                        00017100
      READ(5,99073) CTIME1,TSRISE,TSSET                                       00017200
C*******  FACTORS TO ADJUST INITIAL CONCENTRATIONS AND WASTE LOADS  ****00017300
      READ(5,99892)(NGROUP(I),I=1,5)                                          00017400
      READ(5,99892) (LGROUP(I),I=1,4)                                         00017500
      READ(5,99892)(MGROUP(I),I=1,5)                                          00017600
C*******  VARYING WASTE FLOW AND CONC CONTROL  *******                       00017700
      READ(5,99892) NJVDIS,ISAN,ISIN,ININ,IRUN                                00017800
C                                                                             00017900
C**** 2.1.4  READ PRINTOUT CONTROL PARAMETERS                                 00018000
C                                                                             00018100
      READ(5,103) HEADER                                                      00018200
      READ(5,40)KDELP1,KDELP2,KDELP3,KDELPC,KDELP4,KDELP5,KDELP6,KDELP8,00018300
```

```
     1 KDELP9                                                                  00018400
       READ(5,99892) IWRITE,MSPEC                                              00018500
C********  READ SUMMARY OUTPUT CONTROL  *******                                00018600
       READ (5,103) HEADER                                                     00018700
       READ (5,99892) NSUM1                                                    00018800
       IF (NSUM1.EQ.0) GO TO 112                                               00018900
         DO 112 N=1,NSUM1                                                      00019000
           READ (5, 40) IPRT1(N), LPRT1(N), IPLT1(N), ISTAT1(N)                00019100
  112    CONTINUE                                                             00019200
       READ (5,99892) NSUM2                                                    00019300
       IF (NSUM2.EQ.0) GO TO 114                                               00019400
         DO 114 N=1,NSUM2                                                      00019500
           READ (5, 40) IPRT2(N), LPRT2(N), IPLT2(N), ISTAT2(N)                00019600
  114    CONTINUE                                                             00019700
       READ (5,99892) NJSTAT,(ISTAT(I),I=1,5)                                  00019800
       IF (NJSTAT.GT.0) READ (5, 40) (JUNCST(N), N=1,NJSTAT)                   00019900
C********  READ CYCLES FOR SLACK WATER AND SNAPSHOT PRINTOUTS  *******         00020000
       READ (5,103) HEADER                                                     00020100
       KTABLE(1)=0                                                             00020200
       I=0                                                                     00020300
65421  CONTINUE                                                               00020400
       I=I+1                                                                   00020500
       READ(5,192) NPC(I),NOPRT(I),KSL(I),KTABLE(I)                            00020600
       IF(NPC(I).EQ.0) GO TO 65427                                             00020700
       IF(KSL(I).GT.0) GO TO 65423                                             00020800
C********  READ SNAPSHOT JUNCTIONS FOR PRINTOUT  *******                       00020900
       NOP=NOPRT(I)                                                            00021000
       READ(5,192) (JPRT(I,J),J=1,NOP)                                         00021100
       GO TO 65425                                                             00021200
65423  CONTINUE                                                               00021300
C********  SET SLACK WATER JUNCTIONS FOR PRINTOUT  *******                     00021400
       CALL SWTABL(I,0)                                                        00021500
65425  CONTINUE                                                               00021600
       GO TO 65421                                                             00021700
65427  CONTINUE                                                               00021800
       NPCYC=I-1                                                               00021900
C********  DATA TRANSFORMATION  *******                                        00022000
       READ(5,99892) (IADDTR(I),I=1,2),(IADOP(K),K=1,5)                        00022100
       READ(5,55001) MLTTRF,(DMULT(K),K=1,5)                                   00022200
       READ(5,99892) LOGTRF,(LOGOP(K),K=1,5)                                   00022300
       IADTRF = IADDTR(1) + IADDTR(2)                                          00022400
       IDATRF = IADTRF + MLTTRF + LOGTRF                                       00022500
       NUMC = IADDTR(1)                                                        00022600
       IF (IADDTR(2).GT.NUMC) NUMC=IADDTR(2)                                   00022700
C********  PRINT PROGRAM CONTROL INFORMATION  *******                          00022800
       WRITE(6,105) (ALPHA(I),I=1,80)                                          00022900
       WRITE (6,806) CTIME1,TSRISE,TSSET                                       00023000
       IF(KDELP1.NE.0) GO TO 143                                               00023100
       WRITE(6,106) NSTART,NSTOP,DELT                                          00023200
       WRITE(6,107)NRSTRT,INCYC,NQCYC,KDCOP,DELTQ1,NSFLD,NSEBB,NDURFL,         00023300
      1 NENDE                                                                  00023400
  143  CONTINUE                                                                00023500
       CALL RMILES                                                             00023600
C********  ORDER AND PRINT DATA TRANSFORMATIONS  *******                       00023700
       IF(IDATRF.EQ.0) GO TO 11334                                             00023800
        WRITE(6,11335)                                                         00023900
        KADTRF = IADTRF                                                        00024000
        L = 0                                                                  00024100
11330  CONTINUE                                                                00024200
       L = L + 1                                                               00024300
       IF (MLTTRF.NE.L) GO TO 11331                                            00024400
```

```
        WRITE(6,11337) L,(DMULT(K),K=1,5)                                  00024500
        GO TO 11330                                                        00024600
11331  CONTINUE                                                            00024700
       IF (LOGTRF.NE.L) GO TO 11332                                        00024800
        WRITE(6,11338) L,(LOGOP(K),K=1,5)                                  00024900
        GO TO 11330                                                        00025000
11332  CONTINUE                                                            00025100
       IF (KADTRF.EQ.0) GO TO 11333                                        00025200
        WRITE(6,11336) L,(IADDTR(I),I=1,2),(IADOP(K),K=1,5)                00025300
        KADTRF = 0                                                         00025400
        GO TO 11330                                                        00025500
11333  CONTINUE                                                            00025600
       IF (L.LT.4) GO TO 11330                                             00025700
11334 CONTINUE                                                             00025800
C                                                                          00025900
C**** 2.1.5  READ PLOTTER CONTROL PARAMETERS                               00026000
C                                                                          00026100
      READ(5,103) HEADER                                                   00026200
      READ(5,10001) NGCYC,MGCYC,NDATA,NDACYC,KPLOP,((GMAX(I),GMIN(I)),I=00026300
     1  1,5)                                                               00026400
      IF (NDATA.EQ.0) NDACYC=240000                                        00026500
C*******  STATION TIME PLOTS  *******                                      00026600
      DO 97653 I=1,5                                                       00026700
       GMAX(I)=GMAX(I)-.01                                                 00026800
97653 CONTINUE                                                             00026900
      IF(NGCYC.EQ.0) GO TO 10442                                           00027000
       DO 10002 I=1,NGCYC                                                  00027100
        READ(5,10003) NGJUNC(I),NGST(I),NGEND(I),NGINT(I),(NGCON(I,J),     0002720C
     1   J=1,5)                                                            00027300
10002  CONTINUE                                                            00027400
       IF(KDELP1.NE.0) GO TO 10007                                         00027500
        WRITE(6,10004) NGCYC                                               00027600
        DO 10005 I=1,NGCYC                                                 00027700
         WRITE(6,10006) NGJUNC(I),NGST(I),NGEND(I),NGINT(I),               0002780C
     1   (NGCON(I,K),K=1,5)                                                0002790C
10005   CONTINUE                                                           00028000
        GO TO 10007                                                        00028100
10442 CONTINUE                                                             00028200
      IF(KDELP1.NE.0) GO TO 10007                                          00028300
       WRITE(6,10441)                                                      00028400
10007 CONTINUE                                                             00028500
C*******  SLACK WATER PROFILE PLOTS *******                                00028600
      IF(MGCYC.EQ.0)GO TO 83472                                            00028700
       READ(5,99892) (IGCF(ITB),ITB=1,5)                                   0002880C
       IWF=0                                                               00028900
C*******  OBSERVED DATA FOR PROFILE PLOTS  *******                         00029000
       READ (5,103) HEADER                                                 00029100
       IF(NDATA.EQ.0)GO TO 83473                                           0002920C
        READ(5,42) (RDATA(I),I=1,NDATA)                                   00029300
        NP = 2**NMODE - 1                                                  00029400
        DO 56610 L=1,NP                                                    0002950C
         READ(5,103) HEADER                                                0002960C
         DO 82671 I=1,3                                                    00029700
          DO 82672 J=1,5                                                   00029800
           READ(5,42) (DATA(I,J,K,L),K=1,NDATA)                            0002990C
82672      CONTINUE                                                        00030000
82671     CONTINUE                                                         00030100
56610    CONTINUE                                                          0003020C
         GO TO 83473                                                       0003030C
83472 CONTINUE                                                             00030400
      IF(KDELP1.NE.0) GO TO 83473                                          0003050C
```

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       WRITE(6,83474)                                                   00030600
83473 CONTINUE                                                          00030700
C                                                                       00030800
C***********************************************************************00030900
C                              SECTION 2.2                              00031000
C                     DEFINE WATER QUALITY INTERACTIONS                 00031100
C***********************************************************************00031200
C                                                                       00031300
      READ(5,103) (ALPHA(I),I=1,20)                                     00031400
      WRITE(6,8600)                                                     00031500
      WRITE(6,8604) (ALPHA(I),I=1,20)                                   00031600
      WRITE(6,8601)                                                     00031700
C                                                                       00031800
C**** 2.2.1  DEFINE AND LINK QUALITY CONSTITUENTS                       00031900
C                                                                       00032000
      READ(5,103) HEADER                                                00032100
      READ(5,99892) NUMCON,NOPT,NSSAT,NITROP                            00032200
      NBRCON = NUMCON                                                   00032300
      IF(NBRCON.EQ.0) NBRCON=5                                          00032400
      IF(NBRCON.GT.NUMC) NUMC=NBRCON                                    00032500
      NALPHA = 120 + NBRCON*20                                          00032600
      READ(5,103) (ALPHA(I),I=121,NALPHA)                               00032700
      IF(NUMCON.NE.0) GO TO 25                                          00032800
C*******  SET DEFAULT CONSTITUENT COEFFICIENTS AND LINKS  *******       00032900
       NUMCON = 5                                                       00033000
       CALL LINK                                                        00033100
       GO TO 26                                                         00033200
25    CONTINUE                                                          00033300
C*******  READ IN CONSTITUENT COEFFICIENTS AND LINKS  *******           00033400
       READ(5,192) (NCONS(K),K=1,5),NCHLO,NAMM,NPHO,NAD1,NAD2,NDO,NNO3  00033500
       DO 41 K=1,NUMCON                                                 00033600
        READ(5,42) (CO(I,K),I=1,5)                                      00033700
41     CONTINUE                                                         00033800
       DO 43 K=1,NUMCON                                                 00033900
        READ(5,42) (FUNC(I,K),I=1,12)                                   00034000
43     CONTINUE                                                         00034100
       READ(5,110) (CLIMIT(K),K=1,NUMCON)                               00034200
26    CONTINUE                                                          00034300
      READ(5,20092) NTCYC1,NTCYC2,TEMP                                  00034400
C*******  WRITE OUT CONSTITUENT COEFFICIENTS AND LINKS  *******         00034500
      WRITE(6,39) NUMCON                                                00034600
      WRITE(6,64380) (ALPHA(I),I=121,NALPHA)                            00034700
      WRITE(6,1164)                                                     00034800
      DO 1165 K=1,NUMCON                                                00034900
       WRITE(6,1166) K,(CO(I,K),I=1,5),(FUNC(I,K),I=1,12)               00035000
1165  CONTINUE                                                          00035100
      WRITE(6,81) NTCYC1,NTCYC2,TEMP                                    00035200
C                                                                       00035300
C**** 2.2.2  READ CONSTITUENT DECAY RATES                               00035400
C                                                                       00035500
      READ(5,103) HEADER                                                00035600
      ND = NNO3 + NDO                                                   00035700
      IF(ND.EQ.0) GO TO 27                                              00035800
       WRITE(6,1160)                                                    00035900
27    CONTINUE                                                          00036000
C*******  INITIALIZE DECAY ARRAYS  *******                              00036100
      CALL DKTABL(1,NJ,NUMCON)                                          00036200
C*******  DECAY LOOP TO SET REACTION RATES AND PARAMETERS  *******      00036300
      DO 46 K=1,NUMCON                                                  00036400
       READ(5,55001) ND,THETA(K)                                        00036500
       IF(NCONS(K).EQ.0) GO TO 46                                       00036600
```

```
      IF(ND.GT.0) GO TO 1001                                            00036700
C*******  SET DEFAULT DECAY RATES  *******                             00036800
       GO TO (310,320,330,340,350),K                                    00036900
310    CONTINUE                                                         00037000
        CALL NORGDK(1,K,NJ)                                             00037100
        READ(5,55001) ND,THETA(7)                                       00037200
        IF(ND.EQ.0) CALL NORGDK(2,7,NJ)                                 00037300
        IF(ND.NE.0) CALL RATEIN(7,NJ,ND)                                00037400
        GO TO 46                                                        00037500
320    CONTINUE                                                         00037600
        CALL NITRIF(K,NITROP,NJ,NMODE)                                  00037700
        GO TO 46                                                        00037800
330    CONTINUE                                                         00037900
        CALL NO3DK(K,NJ)                                                00038000
        GO TO 46                                                        00038100
340    CONTINUE                                                         00038200
        CALL CBODDK(1,K,NJ)                                             00038300
        READ(5,55001) ND,THETA(6)                                       00038400
        IF (ND.EQ.0) CALL CBODDK(2,6,NJ)                                00038500
        IF(ND.NE.0) CALL RATEIN(6,NJ,ND)                                00038600
        GO TO 46                                                        00038700
350    CONTINUE                                                         00038800
        CALL DOBUDG(1,K,NJ,NMODE)                                       00038900
        GO TO 46                                                        00039000
C*******  READ IN REACTION RATES  *******                              00039100
1001   CONTINUE                                                         00039200
       CALL RATEIN(K,NJ,ND)                                             00039300
C*******  CHECK FOR SPECIAL FUNCTIONS  *******                         00039400
       IF(K.NE.NAD1) GO TO 360                                          00039500
        READ(5,55001) ND,THETA(6)                                       00039600
        IF(ND.EQ.0) CALL CBODDK(2,6,NJ)                                 00039700
        IF(ND.NE.0) CALL RATEIN(6,NJ,ND)                                00039800
 360   CONTINUE                                                         00039900
       IF(K.NE.NAD2) GO TO 370                                          00040000
        READ(5,55001) ND,THETA(7)                                       00040100
        IF(ND.EQ.0) CALL NORGDK(2,7,NJ)                                 00040200
        IF(ND.NE.0) CALL RATEIN(7,NJ,ND)                                00040300
370    CONTINUE                                                         00040400
       IF(K.EQ.NDO) CALL DOBUDG(2,K,NJ,NMODE)                           00040500
       IF(FUNC(7,K).NE.0) CALL NORDR(1,K,NJ,0,0)                        00040600
       IF(FUNC(8,K).NE.0) CALL ALGUPT                                   00040700
       IF(FUNC(9,K).NE.0) CALL ALGUPT                                   00040800
       IF(FUNC(12,K).EQ.0) GO TO 380                                    00040900
        READ(5,801) DNMAX,DNBRK,DNDOBR,DNSTRT,THETDN                    00041000
        WRITE(6,1805) DNSTRT,DNSTRT,DNDOBR,DNBRK,DNDOBR,DNMAX,THETDN    00041100
380    CONTINUE                                                         00041200
46    CONTINUE                                                          00041300
C*******  END OF DECAY LOOP  *******                                   00041400
C                                                                       00041500
C**** 2.2.3  PRINT AND ADJUST DECAY RATES                               00041600
C                                                                       00041700
C*******  PRINT TABLE OF DECAY RATES AT 20 C  *******                  00041800
      IF(NDO.EQ.0) GO TO 8299                                           00041900
       CALL DKTABL(2,NJ,NUMCON,20.0)                                    00042000
       GO TO 8300                                                       00042100
8299  CONTINUE                                                          00042200
       CALL DKTABL(3,NJ,NUMCON,20.0)                                    00042300
8300  CONTINUE                                                          00042400
C*******  CORRECT RATES TO INITIAL TEMPERATURE  *******                00042500
      DO 6442 K=1,NUMCON                                                00042600
       IF(NCONS(K).EQ.0) GO TO 6442                                     00042700
```

```
      IF(THETA(K).NE.1.0) CALL TEMPCR(K,NJ,TEMP,20.0,THETA(K))
      IF(K.EQ.NDO) CALL DOBUDG(3,K,NJ,NMODE)
      IF(FUNC(10,K).EQ.0) GO TO 6440
       IF(THETA(6).NE.1.0) CALL TEMPCR(6,NJ,TEMP,20.0,THETA(6))
 6440 CONTINUE
      IF(FUNC(11,K).EQ.0) GO TO 6441
       IF(THETA(7).NE.1.0) CALL TEMPCR(7,NJ,TEMP,20.0,THETA(7))
 6441 CONTINUE
      IF(FUNC(12,K).NE.0) CALL DENIT(1)
 6442 CONTINUE
C*******  PRINT TABLE OF DECAY RATES AT AMBIENT TEMPERATURE  *******
      IF(KDELP2.NE.0) GO TO 703
       IF(NDO.EQ.0) GO TO 702
        CALL DKTABL(2,NJ,NUMCON,TEMP)
        GO TO 703
 702   CONTINUE
        CALL DKTABL(3,NJ,NUMCON,TEMP)
 703  CONTINUE
C*******  CORRECT RATES TO INTERNAL UNITS  *******
      DO 704 K=1,NUMCON
       IF(NCONS(K).EQ.0) GO TO 704
        IF(K.EQ.NDO) CALL DOBUDG(4,K,NJ,NMODE)
        IF(FUNC(10,K).NE.0) CALL INUNIT(1,6,NJ)
        IF(FUNC(11,K).NE.0) CALL INUNIT(1,7,NJ)
        IF(FUNC(7,K).EQ.0) CALL INUNIT(1,K,NJ)
 704  CONTINUE
C
C*************************************************************************
C                              SECTION 2.3
C                 SPECIFY WASTEWATER AND TRIBUTARY LOADS
C*************************************************************************
C
      READ(5,103) (ALPHA(I),I=1,20)
      IF (KDELP3.NE.0) GO TO 212
       WRITE(6,8600)
       WRITE(6,8604) (ALPHA(I),I=1,20)
       WRITE(6,8601)
 212  CONTINUE
C
C**** 2.3.1  READ FACTORS TO ADJUST INPUT LOADINGS BY ZONE AND TYPE
C
      READ(5,103) HEADER
      CALL WWADJ(1,NUMCON,NJ,0,0,0)
      MG = 0
      DO 5218 I=1,NUMCON
       MG = MG + MGROUP(I)
 5218 CONTINUE
      IF(MG.NE.0) CALL WWADJ(2,NUMCON,NJ,0,0,0)
C
C**** 2.3.2  READ, ADJUST, AND PRINT CONSTANT INPUT LOADS
C
      READ(5,103) HEADER
      CALL CWASTE(1,NUMCON,NJ,0,0)
C*******  CHECK FOR RESTART CSPEC ON UNIT 8  *******
      IF(KZOP.EQ.2) KDELP3=2
      IF(KZOP.NE.0) CALL CWASTE(3,NUMCON,NJ,0,0)
C*******  ADD AVERAGE UPSTREAM BOUNDARY LOAD TO CONST WASTE TABLE  *****
      KDELP3=1
      CALL CWASTE(2,NUMCON,NJ,0,0)
C
C**** 2.3.3  ANALYZE CONSTANT INPUT LOADS BY TYPE AND ZONE
```

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C                                                                       00048900
      IF(KDELPC.EQ.0) CALL CWASTE(4,NUMCON,NJ,NZ1,NZ2)                  00049000
C                                                                       00049100
C**** 2.3.4  READ AND PRINT VARYING INPUT LOADS                         00049200
C                                                                       00049300
      READ(5,103) HEADER                                                00049400
      IF(NJVDIS.EQ.0) GO TO 205                                         00049500
       CALL VWASTE(1,NUMCON,NJVDIS,NZ1,NZ2)                             00049600
C                                                                       00049700
C**** 2.3.5  ANALYZE VARYING INPUT LOADS BY TYPE, ZONE, AND PERIOD      00049800
C                                                                       00049900
       IF(KDELPC.EQ.0) CALL VWASTE(2,NUMCON,NJVDIS,NZ1,NZ2)             00050000
205   CONTINUE                                                          00050100
C                                                                       00050200
C***********************************************************************00050300
C                              SECTION 2.4                              00050400
C                 SPECIFY WATER QUALITY BOUNDARY CONDITIONS              00050500
C***********************************************************************00050600
C                                                                       00050700
      READ(5,103) (ALPHA(I),I=1,20)                                     00050800
      IF (KDELP4.NE.0) GO TO 8751                                       00050900
       WRITE(6,8600)                                                    00051000
       WRITE(6,8604) (ALPHA(I),I=1,20)                                  00051100
       WRITE(6,8601)                                                    00051200
8751  CONTINUE                                                          00051300
C                                                                       00051400
C**** 2.4.1  READ BOUNDARY CONTROL PARAMETERS                           00051500
C                                                                       00051600
      READ(5,7000)(ALPHA(I),I=1,3),CRF(6),(CRF(I),I=1,5),               00051700
     1NSPEC,IVBC1,IVBC2,IVBC3                                           00051800
C                                                                       00051900
C**** 2.4.2  READ AND SET SEAWARD BOUNDARY CONCENTRATIONS               00052000
C                                                                       00052100
C*******  BOUNDARY CONCENTRATION FOR NODE 1 *******                     00052200
      NPBC1 = 0                                                         00052300
      DO 58305 I=1,IVBC1                                                00052400
       READ(5,55001) INCBC1(I),(VBC1(I,K),K=1,NUMCON)                   00052500
       NPBC1 = NPBC1 + INCBC1(I)                                        00052600
       DO 58306 K=1,NUMCON                                              00052700
        VBC1(I,K) = VBC1(I,K) * CRF(K)                                  00052800
58306  CONTINUE                                                         00052900
58305 CONTINUE                                                          00053000
      KBCI1 = 1                                                         00053100
      KBCC1 = 0                                                         00053200
58310 CONTINUE                                                          00053300
C*******  BOUNDARY CONCENTRATION FOR NODE 2 *******                     00053400
      NPBC2 = 0                                                         00053500
      DO 58315 I=1,IVBC2                                                00053600
       READ(5,55001) INCBC2(I),(VBC2(I,K),K=1,NUMCON)                   00053700
       NPBC2 = NPBC2 + INCBC2(I)                                        00053800
       DO 58316 K=1,NUMCON                                              00053900
        VBC2(I,K) = VBC2(I,K) * CRF(K)                                  00054000
58316  CONTINUE                                                         00054100
58315 CONTINUE                                                          00054200
      KBCI2 = 1                                                         00054300
      KBCC2 = 0                                                         00054400
58320 CONTINUE                                                          00054500
C*******  SET INITIAL SEAWARD BOUNDARY CONCENTRATIONS  *******          00054600
      DO 354 K=1,NUMCON                                                 00054700
       CINCR(K) = 0.0                                                   00054800
       CIN1(K) = VBC1(1,K)                                              00054900
```

```
       CINMAX(K) = VBC2(1,K)                                                    00055000
354    CONTINUE                                                                 00055100
C                                                                               00055200
C**** 2.4.3  READ AND SET UPSTREAM BOUNDARY LOAD                                00055300
C                                                                               00055400
       NJVDIS = NJVDIS + 1                                                      00055500
       J = NJVDIS                                                               00055600
       L = 76                                                                   00055700
       IF(NMODE.EQ.2) L=141                                                     00055800
       NJVD(J) = L                                                              00055900
       NINCF(J)=IVBC3                                                           00056000
       NPERF(J)=0                                                               00056100
       KCLF(J) = 1                                                              00056200
       KFK(J) = 0                                                               00056300
       READ(5,55001)(INCF(J,K),FLO(J,K),(CON(I,J,K),I=1,5),K=1,IVBC3)           00056400
       DO 58360 K=1,IVBC3                                                       00056500
        FLO(J,K)=FLO(J,K)*CRF(6)                                                00056600
        NPERF(J)=NPERF(J) + INCF(J,K)                                           00056700
        DO 58365 I=1,NUMCON                                                     00056800
         CON(I,J,K)=CON(I,J,K)*CRF(I)                                           00056900
58365   CONTINUE                                                                00057000
58360  CONTINUE                                                                 00057100
C                                                                               00057200
C**** 2.4.4  PRINT BOUNDARY CONDITIONS                                          00057300
C                                                                               00057400
       IF(KDELP4.NE.0) GO TO 191                                                00057500
       II = 1                                                                   00057600
       III = 0                                                                  00057700
       WRITE (6,188) NPBC1                                                      00057800
       DO 181 I=1,IVBC1                                                         00057900
        II = II + III                                                           00058000
        WRITE(6,4995) II,INCBC1(I),(VBC1(I,K),K=1,NUMCON)                       00058100
        III = INCBC1(I)                                                         00058200
181    CONTINUE                                                                 00058300
       II = 1                                                                   00058400
       III = 0                                                                  00058500
       WRITE (6,189) NPBC2                                                      00058600
       DO 190 I=1,IVBC2                                                         00058700
        II = II + III                                                           00058800
        WRITE(6,4995) II,INCBC2(I),(VBC2(I,K),K=1,NUMCON)                       00058900
        III = INCBC2(I)                                                         00059000
190    CONTINUE                                                                 00059100
       WRITE(6,7079)                                                            00059200
       WRITE(6,7072) L,(ALPHA(I),I=1,3),NPERF(J)                                00059300
       II = 1                                                                   00059400
       III = 0                                                                  00059500
       DO 58370 K=1,IVBC3                                                       00059600
        II = II + III                                                           00059700
        WRITE(6,7078)II,INCF(J,K),FLO(J,K),(CON(I,J,K),I=1,NUMCON)              00059800
        III = INCF(J,K)                                                         00059900
58370 CONTINUE                                                                  00060000
191    CONTINUE                                                                 00060100
C                                                                               00060200
C*****************************************************************************00060300
C                              SECTION 2.5                                      00060400
C                        PRINT HYDRAULIC INPUTS                                 00060500
C*****************************************************************************00060600
C                                                                               00060700
C*******  PRINT NETWORK AND HYDRAULIC PARAMETERS  *******                       00060800
       IF(KDELP5.NE.0) GO TO 79                                                 00060900
        IF(NJ - NC)72,72,70                                                     00061000
```

```
70     CONTINUE                                                                 00061100
       N1 = NC                                                                  00061200
       N2 = NJ                                                                  00061300
       GO TO 74                                                                 00061400
72     CONTINUE                                                                 00061500
       N1 = NJ                                                                  00061600
       N2 = NC                                                                  00061700
       WRITE(6,8600)                                                            00061800
       WRITE(6,8576)                                                            00061900
       WRITE(6,8601)                                                            00062000
74     CONTINUE                                                                 00062100
       WRITE(6,196)              (N,CLEN(N),B(N),AREA(N),CN(N),QNET(N),         00062200
     1 R(N),(NJUNC(N,K),K=1,2),N,QIN(N),Y(N),(NCHAN(N,I),I=1,5),N=1,N1)         00062300
       N1 = N1 + 1                                                              00062400
       IF(NJ - NC)76,79,78                                                      00062500
78     CONTINUE                                                                 00062600
       WRITE(6,195)      (J,QIN(J),Y(J),(NCHAN(J,K),K=1,5),J=N1,N2)            00062700
       GO TO 79                                                                 00062800
76     CONTINUE                                                                 00062900
       WRITE(6,194)              (N,CLEN(N),B(N),AREA(N),CN(N),QNET(N),         00063000
     1 R(N),(NJUNC(N,K),K=1,2),N=N1,N2)                                         00063100
79     CONTINUE                                                                 00063200
C                                                                               00063300
C*******************************************************************************00063400
C                              SECTION 2.6                                      00063500
C                 SPECIFY INITIAL WATER QUALITY CONDITIONS                      00063600
C*******************************************************************************00063700
C                                                                               00063800
      READ(5,103) (ALPHA(I),I=1,20)                                             00063900
      WRITE(6,8600)                                                             00064000
      WRITE(6,8604) (ALPHA(I),I=1,20)                                           00064100
      WRITE(6,8601)                                                             00064200
C                                                                               00064300
C**** 2.6.1  READ INITIAL CONDITIONS                                            00064400
C                                                                               00064500
C*******  CHECK FOR RESTART IC ON UNIT 8  *******                               00064600
      IF(KZOP.EQ.0) GO TO 64350                                                 00064700
       READ(8) ((C(J,K),K=1,NUMCON),J=1,NJ)                                     00064800
       GO TO 8651                                                               00064900
64350 CONTINUE                                                                  00065000
C*******  READ INITIAL WATER QUALITY CONDITIONS BY NODES                        00065100
       READ(5,200) JJ,(C(1,K),K=1,NUMCON)                                       00065200
       IF(JJ.NE.NJ) GO TO 8650                                                  00065300
        DO 8649 J=2,NJ                                                          00065400
         DO 8648 K=1,NUMCON                                                     00065500
          C(J,K) = C(1,K)                                                       00065600
8648     CONTINUE                                                               00065700
8649    CONTINUE                                                                00065800
        GO TO 8651                                                              00065900
8650   CONTINUE                                                                 00066000
        DO 126 J=2,NJ                                                           00066100
         READ (5,200) JJ,(C(J,K),K=1,NUMCON)                                    00066200
         IF (JJ-J) 128,126,128                                                  00066300
128      CONTINUE                                                               00066400
          WRITE (6,204) JJ,J                                                    00066500
          CALL EXIT                                                             00066600
126     CONTINUE                                                                00066700
8651  CONTINUE                                                                  00066800
C                                                                               00066900
C**** 2.6.2  DUPLICATE CONSTITUENT CONCENTRATIONS                               00067000
C                                                                               00067100
```

```
      IF (NOPT.EQ.0) GO TO 3000                                          00067200
       GO TO (3010,3020,3030,3040,3050,3060),NOPT                        00067300
3010   CONTINUE                                                          00067400
        DO 3015 J=1,NJ                                                   00067500
         DO 3015 K=2,NUMCON                                              00067600
          C(J,K) = C(J,1)                                                00067700
          CSPEC(J,K) = CSPEC(J,I)                                        00067800
3015    CONTINUE                                                         00067900
        GO TO 3000                                                       00068000
3020   CONTINUE                                                          00068100
        DO 3025 J=1,NJ                                                   00068200
         DO 3025 K=3,NUMCON                                              00068300
          C(J,K)= C(J,2)                                                 00068400
          CSPEC(J,K) = CSPEC(J,2)                                        00068500
3025    CONTINUE                                                         00068600
        GO TO 3000                                                       00068700
3030   CONTINUE                                                          00068800
        DO 3035 J=1,NJ                                                   00068900
         DO 3035 K=4,NUMCON                                              00069000
          C(J,K) = C(J,3)                                                00069100
          CSPEC(J,K) = CSPEC(J,3)                                        00069200
3035    CONTINUE                                                         00069300
        GO TO 3000                                                       00069400
3040   CONTINUE                                                          00069500
        DO 3045 J=1,NJ                                                   00069600
         C(J,5)=C(J,4)                                                   00069700
         CSPEC(J,5) = CSPEC(J,4)                                         00069800
3045    CONTINUE                                                         00069900
        GO TO 3000                                                       00070000
3050   CONTINUE                                                          00070100
        DO 3055 J=1,NJ                                                   00070200
         DO 3055 K=3,4                                                   00070300
          C(J,K) = C(J,5)                                                00070400
          CSPEC(J,K) = CSPEC(J,5)                                        00070500
3055    CONTINUE                                                         00070600
        GO TO 3000                                                       00070700
3060   CONTINUE                                                          00070800
        DO 3065 J=1,NJ                                                   00070900
         DO 3065 K=1,NUMCON                                              00071000
          C(J,K) = C(J,4)                                                00071100
          CSPEC(J,K) = CSPEC(J,4)                                        00071200
3065    CONTINUE                                                         00071300
3000  CONTINUE                                                           00071400
C                                                                        00071500
C**** 2.6.3  READ FACTORS AND ADJUST INITIAL CONCENTRATIONS               00071600
C                                                                        00071700
      READ(5,103) HEADER                                                 00071800
      DO 222 I=1,NUMCON                                                  00071900
       IF(NGROUP(I).EQ.0) GO TO 222                                      00072000
        NG=NGROUP(I)                                                     00072100
        IF(NG.GT.100) GO TO 218                                          00072200
         READ(5,5220) (FACTR(I,K),NJSTRT(I,K),NJSTOP(I,K),K=1,NG)        00072300
         GO TO 222                                                       00072400
218     CONTINUE                                                         00072500
        NG=NG-100                                                        00072600
        READ(5,221) (FACTR(I,K),RMSTRT(I,K),RMSTOP(I,K),K=1,NG)          00072700
        NG=NG + 100                                                      00072800
222   CONTINUE                                                           00072900
      DO 238 I=1,NUMCON                                                  00073000
       IF(NGROUP(I).EQ.0) GO TO 238                                      00073100
        NG=NGROUP(I)                                                     00073200
```

```
      IF(NG.GT.100) GO TO 233                                           00073300
       DO 232 K=1,NG                                                    00073400
        NJ1=NJSTRT(I,K)                                                 00073500
        NJ2=NJSTOP(I,K)                                                 00073600
        DO 231 J=NJ1,NJ2                                                00073700
         C(J,I)=C(J,I)*FACTR(I,K)                                       00073800
231     CONTINUE                                                        00073900
232    CONTINUE                                                         00074000
       GO TO 238                                                        00074100
233    CONTINUE                                                         00074200
       NG=NG-100                                                        00074300
       DO 236 K=1,NG                                                    00074400
        M1=RMSTRT(I,K) + 0.5                                            00074500
        M2=RMSTOP(I,K)-0.5                                              00074600
        DO 235 M=M1,M2                                                  00074700
         DO 234 N=1,3                                                   00074800
          L=NODERM(M,N)                                                 00074900
          IF(L.EQ.0) GO TO 234                                          00075000
           C(L,I)=C(L,I)*FACTR(I,K)                                     00075100
234      CONTINUE                                                       00075200
235     CONTINUE                                                        00075300
236    CONTINUE                                                         00075400
238  CONTINUE                                                          00075500
C                                                                       00075600
C**** 2.6.4  PRINT INITIAL QUALITY CONCENTRATIONS                       00075700
C                                                                       00075800
      WRITE(6,241)                                                      00075900
      DO 283 J=1,NJ                                                     00076000
       WRITE(6,282)    J,QINWQ(J),(C(J,K),CSPEC(J,K),K=1,NUMCON)        00076100
  283 CONTINUE                                                          00076200
C                                                                       00076300
C***********************************************************************00076400
C                              SECTION 2.7                              00076500
C                  INITIALIZE VARIABLES FOR SIMULATION                  00076600
C***********************************************************************00076700
C                                                                       00076800
C                                                                       00076900
C**** 2.7.1  INITIALIZE COUNTERS AND FLAGS                              00077000
C                                                                       00077100
      DO 8104 I=1,NUMCON                                                00077200
       DMASS(I)=0.0                                                     00077300
       DO 8103 J=1,NJ                                                   00077400
        DPMASS(J,I) = 0.0                                               00077500
8103   CONTINUE                                                         00077600
8104  CONTINUE                                                          00077700
      TVOL = 0.0                                                        00077800
      IIP = 1                                                           00077900
      KK=0                                                              00078000
      NTIMES = 0                                                        00078100
      CTIME = CTIME1                                                    00078200
      IF(MSPEC.EQ.0) MSPEC=NSPEC                                        00078300
      NS1 = 1                                                           00078400
      NS2 = 1                                                           00078500
      NCOUNT = 0                                                        00078600
      NTEMP = NSTOP - NODYN                                             00078700
      DO 358 N=1,NC                                                     00078800
       IF(NJUNC(N,1)-NJUNC(N,2))358,358,357                             00078900
357    CONTINUE                                                         00079000
        KEEP=NJUNC(N,1)                                                 00079100
        NJUNC(N,1)=NJUNC(N,2)                                           00079200
        NJUNC(N,2)=KEEP                                                 00079300
```

```
358   CONTINUE                                                          00079400
C                                                                       00079500
C**** 2.7.2  CALCULATE INITIAL VOLUMES AND MASSES                       00079600
C                                                                       00079700
C*******  CORRECT VOLUMES FOR INITIAL STARTING CONDITIONS  *******      00079800
774   CONTINUE                                                          00079900
      READ(3)     ICYCTF,(YNEW(J),J=1,NJ)                             00080000
      IF(ICYCTF-NRSTRT)775,776,776                                      00080100
775   CONTINUE                                                          00080200
       READ(3)    (Q(N),V(N) ,N=1,NC)                                 00080300
       GO TO 774                                                        00080400
776   CONTINUE                                                          00080500
      DO 780 J=1,NJ                                                     00080600
       VOL(J) =AVOL(J) + ASUR(J)*(YNEW(J)-Y(J))                         00080700
       Y(J)   = YNEW(J)                                                 00080800
780   CONTINUE                                                          00080900
C*******  CALCULATE INITIAL MASS  *******                               00081000
      DO 378 J=1,NJ                                                     00081100
       DO 377 K=1,NUMCON                                                00081200
        CMASS(J,K)= C(J,K) * VOL(J)                                     00081300
377    CONTINUE                                                         00081400
378   CONTINUE                                                          00081500
C                                                                       00081600
C**** 2.7.3  PREPARE INFLOWS AND LOADS                                  00081700
C                                                                       00081800
C*******  SUBTRACT UPSTREAM BOUNDARY LOAD FROM CSPEC *******            00081900
      L = 76                                                            00082000
      IF(NMODE.EQ.2) L=141                                              00082100
      QINWQ(L)=QINWQ(L)-WFLO(1,1)                                       00082200
      DO 209 K=1,NUMCON                                                 00082300
       CSPEC(L,K)=CSPEC(L,K)-WLOAD(K,1)                                 00082400
209   CONTINUE                                                          00082500
C*******  COMPUTE INFLOW VOLUMES AND CONSTANT WASTEWATER MASSES  *******00082600
      DO 388 J=1,NJ                                                     00082700
       VOLQIN(J) = QINWQ(J) * DELTQ                                     00082800
       DO 207 K=1,NUMCON                                                00082900
        CSPEC(J,K)=CSPEC(J,K)*DELTQ/0.005385                            00083000
207    CONTINUE                                                         00083100
388   CONTINUE                                                          00083200
      DO 78700 J=1,NJVDIS                                               00083300
       KKK = NINCF(J)                                                   00083400
       DO 78701 K=1,KKK                                                 00083500
        FLO(J,K) = FLO(J,K) * DELTQ                                     00083600
78701  CONTINUE                                                         00083700
78700 CONTINUE                                                          00083800
C                                                                       00083900
C**** 2.7.4  STORE INITIAL CONDITIONS TO EXTRACT FIRST TIDAL CYCLE      00084000
C                                                                       00084100
      IF(IWRITE.GE.INCYC)GO TO 34                                       00084200
       WRITE(10)     IWRITE,((C(J,K),K=1,NUMCON),J=1,NJ)                00084300
34    CONTINUE                                                          00084400
C                                                                       00084500
C**** 2.7.5  POSITION VARIABLES AND UNITS FOR RESTART RUNS              00084600
C                                                                       00084700
C*******  POSITION TIME PLOT UNIT  *******                              00084800
      IF(INCYC.EQ.1) GO TO 64375                                        00084900
       IF(NGCYC.EQ.0) GO TO 64375                                       00085000
        ND = NUMCON                                                     00085100
        IF(IDATRF.NE.0) ND=5                                            00085200
        II=INCYC-1                                                      00085300
        DO 64374 I=1,II                                                 00085400
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        DO 64373 J=1,NGCYC                                              00085500
         READ(11) ICYC,(TRNSC(K),K=1,ND)                                00085600
64373    CONTINUE                                                       00085700
64374   CONTINUE                                                        00085800
64375 CONTINUE                                                          00085900
C*******  POSITION VARIABLE WASTE LOADS AND BOUNDARIES  *******        00086000
      IF(INCYC.EQ.1) GO TO 65375                                        00086100
       II=INCYC-1                                                       00086200
       DO 65374 I=1,II                                                  00086300
        DO 65371 J=1,NJVDIS                                             00086400
         K=KCLF(J)                                                      00086500
         KFK(J) = KFK(J) + 1                                            00086600
         IF(KFK(J).LT.INCF(J,K)) GO TO 65370                            00086700
          KCLF(J) = KCLF(J) + 1                                         00086800
          KFK(J) = 0                                                    00086900
          IF(KCLF(J).LE.NINCF(J)) GO TO 65370                           00087000
           KCLF(J) = 1                                                  00087100
65370    CONTINUE                                                       00087200
65371   CONTINUE                                                        00087300
        KBCC1 = KBCC1 + 1                                               00087400
        IF(KBCC1.LE.INCBC1(KBCI1)) GO TO 65372                          00087500
         KBCI1 = KBCI1 + 1                                              00087600
         KBCC1 = 1                                                      00087700
         IF(KBCI1.LE.IVBC1) GO TO 65372                                 00087800
          KBCI1 = 1                                                     00087900
65372   CONTINUE                                                        00088000
        KBCC2 = KBCC2 + 1                                               00088100
        IF(KBCC2.LE.INCBC2(KBCI2)) GO TO 65373                          00088200
         KBCI2 = KBCI2 + 1                                              00088300
         KBCC2 = 1                                                      00088400
         IF(KBCI2.LE.IVBC2) GO TO 65373                                 00088500
          KBCI2 = 1                                                     00088600
65373   CONTINUE                                                        00088700
65374  CONTINUE                                                         00088800
65375 CONTINUE                                                          00088900
C                                                                       00089000
C***********************************************************************00089100
C                              SECTION 2.8                              00089200
C            SET ADVECTIVE AND DISPERSIVE TRANSPORT FACTORS             00089300
C***********************************************************************00089400
C                                                                       00089500
      READ(5,103) (ALPHA(I),I=1,20)                                     00089600
      IF (KDELP8.NE.0) GO TO 8752                                       00089700
       WRITE(6,8600)                                                    00089800
       WRITE(6,8604) (ALPHA(I),I=1,20)                                  00089900
       WRITE(6,8601)                                                    00090000
8752  CONTINUE                                                          00090100
C                                                                       00090200
C**** 2.8.1  READ CONSTANT ADVECTION AND EDDY DIFFUSION FACTORS         00090300
C                                                                       00090400
      READ(5,55001) KADV,CDIFFK,XCU,XCD,XCEBB                           00090500
      DO 2000 N=1,NC                                                    00090600
       CU(N) = XCU                                                      00090700
       CD(N) = XCD                                                      00090800
       DIFFK(N)=CDIFFK                                                  00090900
2000  CONTINUE                                                          00091000
C                                                                       00091100
C**** 2.8.2  SET VARYING ADVECTION FACTORS                              00091200
C                                                                       00091300
C*******  CHECK FOR RESTART ADVECTION FACTORS ON UNIT 8  *******        00091400
      IF(KZOP.EQ.0) GO TO 64850                                         00091500
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      READ(8)(CU(N),CD(N),CEBB(N),N=1,NC)                                00091600
      REWIND 8                                                           00091700
      GO TO 390                                                          00091800
64850 CONTINUE                                                           00091900
C*******  READ VARYING ADVECTION FACTORS                                 00092000
      READ(5,103) HEADER                                                 00092100
556   CONTINUE                                                           00092200
       READ(5,200) N,YCU,YCD                                             00092300
       IF (N.GT.999) GO TO 2011                                          00092400
        CU(N) = YCU                                                      00092500
        CD(N) = YCD                                                      00092600
        GO TO 556                                                        00092700
2011  CONTINUE                                                           00092800
       IF(KADV.NE.2) GO TO 390                                           00092900
        DO 391 N=1,NC                                                    00093000
         CEBB(N) = XCEBB                                                 00093100
391      CONTINUE                                                        00093200
        READ(5,103) HEADER                                               00093300
393     CONTINUE                                                         00093400
        READ(5,200) N,YCEBB                                              00093500
        IF(N.GT.999) GO TO 392                                           00093600
         CEBB(N) = YCEBB                                                 00093700
         GO TO 393                                                       00093800
392     CONTINUE                                                         00093900
390   CONTINUE                                                           00094000
C                                                                        00094100
C**** 2.8.3  PREPARE VARYING LONGITUDINAL DISPERSION FACTORS             00094200
C                                                                        00094300
      CALL LDISP(1,NMODE)                                                00094400
C*******  CONVERT DIFFK TO SQUARE MILES/DAY FOR TABLE  *******           00094500
385   CONTINUE                                                           00094600
      DO 2030 N=1,NC                                                     00094700
       VMEAN(N) = DIFFK(N) * VMEAN(N) * R(N) * 0.00309                   00094800
2030  CONTINUE                                                           00094900
C                                                                        00095000
C**** 2.8.4  PRINT ADVECTIVE AND DISPERSIVE TRANSPORT FACTORS            00095100
C                                                                        00095200
      IF(KDELP8.NE.0) GO TO 2018                                         00095300
       IF(KADV.EQ.2) GO TO 2015                                          00095400
        WRITE(6,2025)                                                    00095500
        DO 386 N=1,NC                                                    00095600
         WRITE(6,397) N,CU(N),CD(N),DIFFK(N),VMEAN(N)                    00095700
386     CONTINUE                                                         00095800
        GO TO 2017                                                       00095900
2015   CONTINUE                                                          00096000
        WRITE(6,395)                                                     00096100
        DO 396 N=1,NC                                                    00096200
         WRITE(6,397) N,CD(N),CEBB(N),DIFFK(N),VMEAN(N)                  00096300
396     CONTINUE                                                         00096400
2017   CONTINUE                                                          00096500
2018  CONTINUE                                                           00096600
C                                                                        00096700
C**** 2.8.5  CONVERT LONGITUDINAL DISPERSION FACTORS TO INTERNAL UNITS   00096800
C                                                                        00096900
      DO 2016 N=1,NC                                                     00097000
       DIFFK(N)=DIFFK(N)*R(N)*DELTQ/CLEN(N)                              00097100
2016  CONTINUE                                                           00097200
C                                                                        00097300
C                                                                        00097400
C                                                                        00097500
C                                                                        00097600
```

```
C*****************************************************************************00097700
C*****************************************************************************00097800
C                                                                              00097900
C                                SECTION 3.0                                   00098000
C                                                                              00098100
C                    SIMULATE WATER QUALITY CONDITIONS                         00098200
C                                                                              00098300
C*****************************************************************************00098400
C*****************************************************************************00098500
C                                                                              00098600
C                                                                              00098700
C                                                                              00098800
      READ(5,103) (ALPHA(I),I=1,20)                                            00098900
      WRITE(6,8600)                                                            00099000
      WRITE(6,8604) (ALPHA(I),I=1,20)                                          00099100
      WRITE(6,8601)                                                            00099200
C*****************************************************************************00099300
C*************************  MAIN QUALITY LOOP  ******************************00099400
C*****************************************************************************00099500
      DO 536 ICYC=INCYC,NOCYC                                                  00099600
C                                                                              00099700
C*****************************************************************************00099800
C                                SECTION 3.1                                   00099900
C                            PERFORM BOOKKEEPING                               00100000
C*****************************************************************************00100100
C                                                                              00100200
C                                                                              00100300
C**** 3.1.1  UPDATE CLOCK TIME TO END OF CURRENT QUALITY CYCLE                  00100400
C                                                                              00100500
      CTIME = CTIME + DELTQ1                                                   00100600
      IF(CTIME.LE.24.) GO TO 4442                                              00100700
       CTIME = DELTQ1                                                          00100800
4442  NOCYCC = ICYC                                                            00100900
C                                                                              00101000
C**** 3.1.2  READ SYSTEM CONDITIONS                                            00101100
C                                                                              00101200
      READ(3)     (Q(N),V(N) ,N=1,NC)                                          00101300
      IF (ICYCTF-NTEMP) 790,794,794                                            00101400
790   CONTINUE                                                                 00101500
       READ(3)      ICYCTF,(YNEW(J),J=1,NJ)                                  00101600
       GO TO 407                                                               00101700
794   CONTINUE                                                                 00101800
       REWIND 3                                                                00101900
       READ(3)      ICYCTF,(YNEW(J),J=1,NJ)                                  00102000
407   CONTINUE                                                                 00102100
C                                                                              00102200
C*****************************************************************************00102300
C                                SECTION 3.2                                   00102400
C          ADJUST BOUNDARY CONDITION FOR CURRENT QUALITY CYCLE                 00102500
C*****************************************************************************00102600
C                                                                              00102700
C                                                                              00102800
C**** 3.2.1  CHECK BOUNDARY CONDITION FOR NODE 1                               00102900
C                                                                              00103000
      KBCC1 = KBCC1 + 1                                                        00103100
      IF(KBCC1.LE.INCBC1(KBCI1)) GO TO 58330                                   00103200
       KBCI1 = KBCI1 + 1                                                       00103300
       KBCC1 = 1                                                               00103400
       IF(KBCI1.LE.IVBC1) GO TO 58328                                          00103500
        KBCI1 = 1                                                              00103600
58328  CONTINUE                                                                00103700
```

```
        DO 58325 I=1,NUMCON                                                  00103800
         CIN1(I) = VBC1(KBCI1,I)                                             00103900
58325   CONTINUE                                                             00104000
58330 CONTINUE                                                               00104100
C                                                                            00104200
C**** 3.2.2  CHECK BOUNDARY CONDITION FOR NODE 2                             00104300
C                                                                            00104400
      KBCC2 = KBCC2 + 1                                                      00104500
      IF(KBCC2.LE.INCBC2(KBCI2)) GO TO 58340                                 00104600
       KBCI2 = KBCI2 + 1                                                     00104700
       KBCC2 = 1                                                             00104800
       IF(KBCI2.LE.IVBC2) GO TO 58338                                        00104900
        KBCI2 = 1                                                            00105000
58338   CONTINUE                                                             00105100
        DO 58335 I=1,NUMCON                                                  00105200
         CINMAX(I) = VBC2(KBCI2,I)                                           00105300
58335   CONTINUE                                                             00105400
58340 CONTINUE                                                               00105500
C*******  ADJUST BC FOR NODE 2 BASED ON CURRENT TIDAL FLOW  *******          00105600
      IF(Q(9))600,601,602                                                    00105700
602   CONTINUE                                                               00105800
       DO 603 K=1,NUMCON                                                     00105900
        C(2,K) = C(2,K) + CINCR(K)                                           00106000
603    CONTINUE                                                              00106100
       GO TO 609                                                             00106200
600   CONTINUE                                                               00106300
       DO 607 K=1,NUMCON                                                     00106400
        C(2,K) = C(11,K)                                                     00106500
        IF(NTAG.NE.NENDE) GO TO 607                                          00106600
         CINCR(K) = (CINMAX(K) - C(2,K)) / FLOAT (NDUREL)                    00106700
607    CONTINUE                                                              00106800
       GO TO 609                                                             00106900
601   CONTINUE                                                               00107000
       IF(NTAG.EQ.NENDE) GO TO 600                                           00107100
        GO TO 602                                                            00107200
609   CONTINUE                                                               00107300
C                                                                            00107400
C**** 3.2.3  ADJUST TIDAL COUNTER TO END OF CURRENT QUALITY CYCLE             00107500
C                                                                            00107600
      NTAG = NTAG + 1                                                        00107700
      IF(NTAG.GE.NSPEC) NTAG=0                                               00107800
C                                                                            00107900
C*****************************************************************************00108000
C                              SECTION 3.3                                   00108100
C                          COMPUTE MASS TRANSPORT                            00108200
C*****************************************************************************00108300
C                                                                            00108400
      DO 416 N=1,NC                                                          00108500
C                                                                            00108600
C**** 3.3.1  COMPUTE ADVECTIVE TRANSPORT FACTORS                             00108700
C                                                                            00108800
       VOLFLW = Q(N) * DELTQ                                                 00108900
       NL = NJUNC(N,1)                                                       00109000
       NH = NJUNC(N,2)                                                       00109100
       IF(Q(N)) 402,404,404                                                  00109200
402    CONTINUE                                                              00109300
        IF(KADV.EQ.2) GO TO 408                                              00109400
         FACTOR = CU(N)                                                      00109500
         GO TO 412                                                           00109600
408    CONTINUE                                                              00109700
        FACTOR = CEBB(N)                                                     00109800
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        GO TO 412                                                       00109900
404     CONTINUE                                                        00110000
        FACTOR = CD(N)                                                  00110100
412     CONTINUE                                                        00110200
C                                                                       00110300
C**** 3.3.2  COMPUTE MASS ADVECTED AND DISPERSED                        00110400
C                                                                       00110500
        DO 414 K=1,NUMCON                                               00110600
         QGRAD = C(NL,K) - C(NH,K)                                      00110700
         CONC = C(NH,K) + FACTOR * QGRAD                                00110800
         ADMASS = CONC * VOLFLW                                         00110900
         DIMASS = DIFFK(N) * ABS (Q(N)) * QGRAD                         00111000
         CMASS(NH,K) = CMASS(NH,K) + ADMASS + DIMASS                    00111100
         CMASS(NL,K) = CMASS(NL,K) - ADMASS - DIMASS                    00111200
         IF (CMASS(NL,K).GE.0.0) GO TO 413                              00111300
          CMASS(NH,K) = CMASS(NH,K) + CMASS(NL,K)                       00111400
          CMASS(NL,K) = 0.0                                             00111500
          GO TO 414                                                     00111600
413      IF (CMASS(NH,K).GE.0.0) GO TO 414                              00111700
          CMASS(NL,K) = CMASS(NL,K) + CMASS(NH,K)                       00111800
          CMASS(NH,K) = 0.0                                             00111900
414     CONTINUE                                                        00112000
416    CONTINUE                                                         00112100
C                                                                       00112200
C***********************************************************************00112300
C                                SECTION 3.4                            00112400
C          READ NEW TEMPERATURE AND CORRECT APPROPRIATE RATES           00112500
C***********************************************************************00112600
C                                                                       00112700
C                                                                       00112800
C**** 3.4.1  CHECK FOR NEW TEMPERATURE                                  00112900
C                                                                       00113000
       IF(ICYC.LE.NTCYC2) GO TO 6500                                    00113100
        T1 = TEMP                                                       00113200
        READ(5,20092)NTCYC1,NTCYC2,TEMP                                 00113300
        WRITE(6,5410)NTCYC1,NTCYC2,TEMP                                 00113400
        DO 6450 K=1,NUMCON                                              00113500
         IF(NCONS(K).EQ.0) GO TO 6450                                   00113600
C                                                                       00113700
C**** 3.4.2  READ NEW PARAMETERS AND SETUP RATES                        00113800
C                                                                       00113900
          IF(K.NE.NAMM) GO TO 659                                       00114000
           READ(5,99892) NITROP,ND                                      00114100
           ND1 = NITROP + ND                                            00114200
           IF(ND1.EQ.0) NITROP=1                                        00114300
           CALL NITRIF(K,NITROP,NJ,NMODE)                               00114400
           IF(NITROP.EQ.0) CALL RATEIN(K,NJ,ND)                         00114500
           GO TO 661                                                    00114600
659       CONTINUE                                                      00114700
           IF(K.NE.NDO) GO TO 660                                       00114800
           CALL DOBUDG(5,K,NJ,NMODE)                                    00114900
           GO TO 661                                                    00115000
660       CONTINUE                                                      00115100
           IF(FUNC(7,K).EQ.0) CALL INUNIT(2,K,NJ)                       00115200
           IF(FUNC(10,K).NE.0) CALL INUNIT(2,6,NJ)                      00115300
           IF(FUNC(11,K).NE.0) CALL INUNIT(2,7,NJ)                      00115400
661       CONTINUE                                                      00115500
C                                                                       00115600
C**** 3.4.3  ADJUST RATES TO NEW TEMPERATURE                            00115700
C                                                                       00115800
          IF(THETA(K).NE.1.0) CALL TEMPCR(K,NJ,TEMP,T1,THETA(K))        00115900
```

```
          IF(K.EQ.NDO) CALL DOBUDG(3,K,NJ,NMODF)                          00116000
          IF(FUNC(10,K).EQ.0) GO TO 662                                   00116100
           IF(THETA (6).NE.1.0) CALL TEMPCR(6,NJ,TEMP,T1,THETA(6))        00116200
662       CONTINUE                                                        00116300
          IF(FUNC(11,K).EQ.0) GO TO 663                                   00116400
           IF(THETA(7).NE.1.0) CALL TEMPCR(7,NJ,TEMP,T1,THETA(7))         00116500
663       CONTINUE                                                        00116600
          IF(FUNC(12,K).NE.0) CALL DENIT(1)                               00116700
6450    CONTINUE                                                          00116800
C                                                                         00116900
C**** 3.4.4  PRINT UPDATED DECAY TABLE                                    00117000
C                                                                         00117100
        IF(NDO.EQ.0) GO TO 664                                            00117200
         CALL DKTABL(2,NJ,NUMCON,TEMP)                                    00117300
         GO TO 665                                                        00117400
664     CONTINUE                                                          00117500
         CALL DKTABL(3,NJ,NUMCON,TEMP)                                    00117600
665     CONTINUE                                                          00117700
C                                                                         00117800
C**** 3.4.5  CORRECT RATES TO INTERNAL UNITS                              00117900
C                                                                         00118000
        DO 705 K=1,NUMCON                                                 00118100
         IF(NCONS(K).EQ.0) GO TO 705                                      00118200
          IF(K.EQ.NDO) CALL DOBUDG(4,K,NJ,NMODE)                          00118300
          IF(FUNC(10,K).NE.0) CALL INUNIT(1,6,NJ)                         00118400
          IF(FUNC(11,K).NE.0) CALL INUNIT(1,7,NJ)                         00118500
          IF(FUNC(7,K).EQ.0) CALL INUNIT(1,K,NJ)                          00118600
705     CONTINUE                                                          00118700
6500  CONTINUE                                                            00118800
C                                                                         00118900
C*************************************************************************00119000
C                              SECTION 3.5                                00119100
C                  COMPUTE DECAY AND MASS TRANSFORMATION                  00119200
C*************************************************************************00119300
C                                                                         00119400
      DO 420 K=1,NUMCON                                                   00119500
       IF(NCONS(K).EQ.0) GO TO 420                                        00119600
        DO 422 J=3,NJ                                                     00119700
         CDO = C(J,NDO)                                                   00119800
C                                                                         00119900
C**** 3.5.1  COMPUTE AMBIENT RATES                                        00120000
C                                                                         00120100
C*******  COMPUTE INSTANTANEOUS DO BUDGET RATES  *******                  00120200
          IF(K.EQ.NDO) CALL DOBUDG(6,K,J,NMODE)                           00120300
C******* COMPUTE HIGH ORDER REACTION RATE PARAMETERS  *******             00120400
          IF(FUNC(7,K).EQ.0) GO TO 2109                                   00120500
           CKT = C(J,K)                                                   00120600
           CALL NORDR(3,K,NJ,CKT,CXT)                                     00120700
2109      CONTINUE                                                        00120800
C*******  COMPUTE DENITRIFICATION RATE FROM AMBIENT DO LEVEL  *******     00120900
          IF(FUNC(12,K).NE.0) CALL DENIT(2)                               00121000
C                                                                         00121100
C**** 3.5.2   APPLY DECAY RATES AND COMPUTE NEW MASS                      00121200
C                                                                         00121300
          XMASJK = CMASS(J,K)                                             00121400
          CALL DECAY(J,K,XMASJK)                                          00121500
          CMASS(J,K) = XMASJK                                             00121600
422      CONTINUE                                                         00121700
420   CONTINUE                                                            00121800
C                                                                         00121900
C*************************************************************************00122000
```

```
C                                SECTION 3.6                                    00122100
C                           ADD WASTE DISCHARGES                                00122200
C*************************************************************************     00122300
C                                                                               00122400
C                                                                               00122500
C**** 3.6.1  ADD VARYING DISCHARGES (INCLUDING UPSTREAM BOUNDARY LOAD)          00122600
C                                                                               00122700
      DO 620 J=1,NJVDIS                                                         00122800
       L = NJVD(J)                                                              00122900
       K = KCLF(J)                                                              00123000
       DO 9040 I=1,NUMCON                                                       00123100
        CMASS(L,I)=CMASS(L,I)-FLO(J,K)*CON(I,J,K)                               00123200
9040   CONTINUE                                                                 00123300
       KFK(J) = KFK(J) + 1                                                      00123400
       IF(KFK(J).LT.INCF(J,K))GO TO 9020                                        00123500
        KCLF(J) = KCLF(J) + 1                                                   00123600
        KFK(J) = 0                                                              00123700
        IF (KCLF(J).LE.NINCF(J)) GO TO 9020                                     00123800
         KCLF(J) = 1                                                            00123900
9020   CONTINUE                                                                 00124000
620   CONTINUE                                                                  00124100
C                                                                               00124200
C**** 3.6.2  ADD CONSTANT WASTEWATER LOADS                                      00124300
C                                                                               00124400
      DO 434 J=3,NJ                                                             00124500
       IF(VOLQIN(J))430,434,432                                                 00124600
430    CONTINUE                                                                 00124700
        DO 431 K=1,NUMCON                                                       00124800
         CMASS(J,K) = CMASS(J,K) + CSPEC(J,K)                                   00124900
431     CONTINUE                                                                00125000
        GO TO 434                                                               00125100
432    CONTINUE                                                                 00125200
        DO 433 K=1,NUMCON                                                       00125300
         CMASS(J,K)=CMASS(J,K) - C(J,K) * VOLQIN(J)                             00125400
433     CONTINUE                                                                00125500
434   CONTINUE                                                                  00125600
C                                                                               00125700
C*************************************************************************     00125800
C                                SECTION 3.7                                    00125900
C                     RECOMPUTE AND CHECK CONCENTRATIONS                        00126000
C*************************************************************************     00126100
C                                                                               00126200
C                                                                               00126300
C**** 3.7.1  UPDATE JUNCTION VOLUME AND NEW CONCENTRATIONS                      00126400
C                                                                               00126500
      DO 453 K=1,NUMCON                                                         00126600
       C(1,K) = CIN1(K)                                                         00126700
453   CONTINUE                                                                  00126800
      DO 446 J=3,NJ                                                             00126900
       VOL(J) = VOL(J) + ASUR(J) * (YNEW(J) - Y(J))                             00127000
       DO 444 K=1,NUMCON                                                        00127100
        C(J,K) =CMASS(J,K) / VOL(J)                                             00127200
444    CONTINUE                                                                 00127300
446   CONTINUE                                                                  00127400
C                                                                               00127500
C**** 3.7.2  PREVENT NEGATIVE CONCENTRATION AND SUPERSATURATION                 00127600
C                                                                               00127700
      DO 466 J=1,NJ                                                             00127800
       Y(J) = YNEW(J)                                                           00127900
       DO 464 K=1,NUMCON                                                        00128000
        IF(C(J,K).GE.0.0) GO TO 463                                             00128100
```

```
        IF(KDCOP.GT.1) GO TO 462                                          00128200
         IF((ICYC+ NSPEC + 1) - NOCYC)462,458,458                         00128300
458      CONTINUE                                                         00128400
          WRITE(6,460)              J,ICYC,K,C(J,K)                       00128500
462     CONTINUE                                                          00128600
        C(J,K) = 0.0                                                      00128700
        DMASS(K)=DMASS(K)-CMASS(J,K)*232.632                              00128800
        DPMASS(J,K) = DPMASS(J,K) - CMASS(J,K)                            00128900
        CMASS(J,K)= 0.0                                                   00129000
        GO TO 464                                                         00129100
*******  REINTRODUCE DEPLETED MASS  *******                               00129200
463     CONTINUE                                                          00129300
        IF (KDCOP.EQ.2) GO TO 464                                         00129400
        IF(DPMASS(J,K).LE.0) GO TO 464                                    00129500
         IF(CMASS(J,K).LT.DPMASS(J,K)) GO TO 459                          00129600
          CMASS(J,K) = CMASS(J,K) - DPMASS(J,K)                           00129700
          DPMASS(J,K) = 0.0                                               00129800
          C(J,K) = CMASS(J,K) / VOL(J)                                    00129900
          GO TO 464                                                       00130000
459      CONTINUE                                                         00130100
          DPMASS(J,K)=DPMASS(J,K) - CMASS(J,K)                            00130200
          CMASS(J,K) = 0.0                                                00130300
          C(J,K) = 0.0                                                    00130400
464    CONTINUE                                                           00130500
466   CONTINUE                                                            00130600
      IF(NSSAT.EQ.1) GO TO 479                                            00130700
       DO 476 K=1,NUMCON                                                  00130800
        IF(FUNC(1,K).EQ.0) GO TO 476                                      00130900
         DO 475 J=1,NJ                                                    00131000
          IF(C(J,K).LE.CSAT) GO TO 475                                    00131100
           WRITE(6,474)                 K,J,ICYC,C(J,K)                   00131200
           C(J,K)  = CSAT                                                 00131300
           CMASS(J,K)  = C(J,K)     * VOL(J)                              00131400
475       CONTINUE                                                        00131500
476     CONTINUE                                                          00131600
479   CONTINUE                                                            00131700
C                                                                         00131800
**** 3.7.3  PREVENT UNREASONABLY HIGH CONCENTRATIONS                       00131900
                                                                          00132000
      DO 482 J=1,NJ                                                       00132100
       DO 480 K=1,NUMCON                                                  00132200
        IF(C(J,K) - CLIMIT(K))480,480,477                                 00132300
477     CONTINUE                                                          00132400
         WRITE(6,478)                K,CLIMIT(K),J,ICYC                   00132500
         WRITE(6,481) ((C(L,M),M=1,NUMCON),L=1,NJ)                        00132600
         CALL EXIT                                                        00132700
480    CONTINUE                                                           00132800
482   CONTINUE                                                            00132900
                                                                          00133000
C*************************************************************************00133100
C                              SECTION 3.8                                00133200
C                         PREPARE AND PRINT OUTPUT                        00133300
C*************************************************************************00133400
C                                                                         00133500
                                                                          00133600
**** 3.8.1  WRITE UNIT 9 FOR RESTARTS                                     00133700
C                                                                         00133800
      IF(ICYC.EQ.NOCYC) GO TO 512                                         00133900
       IF(ICYC.LT.IWRITE) GO TO 520                                       00134000
512   CONTINUE                                                            00134100
       WRITE(9)(VOLOIN(J),(CSPEC(J,K),K=1,NUMCON),J=1,NJ)                 00134200
```

```
      WRITE(9)((C(J,K),K=1,NUMCON),J=1,NJ)                              00134300
      WRITE(9)(CU(N),CD(N),CFBR(N),N=1,NC)                              00134400
      WRITE(6,518)              ICYC,ICYCTF,NTAG                        00134500
      REWIND 9                                                          00134600
      IWRITE = IWRITE + NSPEC                                           00134700
      IF(KDELP9.GT.0) GO TO 520                                         00134800
C*******  COMPUTE TOTAL MASS IN ESTUARY  *******                        00134900
       DO 8101 I=1,NUMCON                                               00135000
        TLBS(I)=0                                                       00135100
        DO 8100 J=1,NJ                                                  00135200
         TLBS(I)=TLBS(I)+CMASS(J,I)                                     00135300
8100     CONTINUE                                                       00135400
        TLBS(I)=TLBS(I)*232.632                                         00135500
8101    CONTINUE                                                        00135600
        WRITE(6,8102) ICYC,(TLBS(I),I=1,NUMCON)                         00135700
        WRITE(6,8106)ICYC,(DMASS(I),I=1,NUMCON)                         00135800
520   CONTINUE                                                          00135900
C                                                                       00136000
C**** 3.8.2  PRINT SUMMARIES AND STATISTICS                             00136100
C                                                                       00136200
C*******  CHECK FOR SUMRY1 OUTPUT *******                               00136300
          IF (NS1.GT.NSUM1) GO TO 490                                   00136400
          IF (ICYC.LT.IPRT1(NS1)) GO TO 490                             00136500
            IP1  = IPRT1(NS1)                                           00136600
            LP1  = LPRT1(NS1)                                           00136700
            IPL1 = IPLT1(NS1)                                           00136800
          CALL SUMARY(IP1,LP1,IPL1,1,NMODE)                             00136900
          IF (ISTAT1(NS1).EQ.1) CALL STATS(IP1,LP1,10)                  00137000
          IF (ICYC.EQ.LPRT1(NS1)) NS1 = NS1 + 1                         00137100
  490     CONTINUE                                                      00137200
C*******  CHECK FOR SUMRY2 OUTPUT *******                               00137300
          IF (NS2.GT.NSUM2) GO TO 498                                   00137400
          IF (ICYC.LT.IPRT2(NS2)) GO TO 498                             00137500
            IP2  = IPRT2(NS2)                                           00137600
            LP2  = LPRT2(NS2)                                           00137700
            IPL2 = IPLT2(NS2)                                           00137800
          CALL SUMARY(IP2,LP2,IPL2,2,NMODE)                             00137900
          IF (ISTAT2(NS2).EQ.1) CALL STATS(IP2,LP2,20)                  00138000
          IF (ICYC.EQ.LPRT2(NS2)) NS2 = NS2 + 1                         00138100
  498     CONTINUE                                                      00138200
C                                                                       00138300
C**** 3.8.3  WRITE UNIT 11 FOR STATION TIME PLOTS                       00138400
C                                                                       00138500
      N11=11                                                            00138600
      IF(NGCYC.EQ.0) GO TO 10011                                        00138700
       DO 10010 J=1,NGCYC                                               00138800
        L=NGJUNC(J)                                                     00138900
C*******  CHECK FOR DATA TRANSFORMATIONS   *******                      00139000
         IF (IDATRF.EQ.0) GO TO 96017                                   00139100
          CALL DATRF(L,NUMCON)                                          00139200
          WRITE(N11) ICYC,(TRNSC(K),K=1,5)                              00139300
          GO TO 96018                                                   00139400
96017    CONTINUE                                                       00139500
          WRITE(N11) ICYC,(C(L,K),K=1,NUMCON)                           00139600
96018    CONTINUE                                                       00139700
10010   CONTINUE                                                        00139800
10011 CONTINUE                                                          00139900
C                                                                       00140000
C**** 3.8.4  READ NEW OBSERVED DATA FOR SW PLOTS                        00140100
C                                                                       00140200
      IF(ICYC.LE.NDACYC) GO TO 97000                                    00140300
```

```
      READ(5,99892) NDACYC                                                  00140400
      DO 97015 L=1,NP                                                       00140500
       READ(5,120) HEADER                                                   00140600
       DO 97005 I11=1,3                                                     00140700
        DO 97004 J11=1,5                                                    00140800
         READ(5,42)    (DATA(I11,J11,K,L),K=1,NDATA)                        00140900
97004    CONTINUE                                                           00141000
97005   CONTINUE                                                            00141100
97015  CONTINUE                                                             00141200
97000 CONTINUE                                                              00141300
                                                                            00141400
C**** 3.8.5  PRINT SLACK WATER / PROFILE TABLES                             00141500
C                                                                           00141600
      IF(NPCYC.EQ.0) GO TO 535                                              00141700
       DO 522 I=IIP,NPCYC                                                   00141800
        IF(ICYC.NE.NPC(I)) GO TO 522                                        00141900
         CALL SWTABL(I,IIP)                                                 00142000
         GO TO 535                                                          00142100
522    CONTINUE                                                             00142200
535   CONTINUE                                                              00142300
                                                                            00142400
C**** 3.8.6  WRITE SLACK WATER / PROFILE PLOTS ON UNIT 22                   00142500
C                                                                           00142600
      IF(KTABLE(IIP).LT.2) GO TO 84237                                      00142700
       IF(MGCYC.EQ.0) GO TO 84237                                           00142800
        IMPOSE = KTABLE(IIP)                                                00142900
        KSLACK = KSL(IIP)                                                   00143000
        IWFFCY = NPC(IIP)                                                   00143100
        DO 84238 I=1,MGCYC                                                  00143200
         CALL SWPLOT                                                        00143300
84238    CONTINUE                                                           00143400
        KTABLE(IIP) = 0                                                     00143500
        IMPOSE = 0                                                          00143600
84237 CONTINUE                                                              00143700
C*************************************************************************00143800
C**********************  END OF MAIN QUALITY LOOP  ***********************00143900
C*************************************************************************00144000
  536 CONTINUE                                                              00144100
C                                                                           00144200
C                                                                           00144300
                                                                            00144400
C                                                                           00144500
C*************************************************************************00144600
C*************************************************************************00144700
                                                                            00144800
C                              SECTION 4.0                                  00144900
C                                                                           00145000
C                                EXIT                                       00145100
C                                                                           00145200
C*************************************************************************00145300
C*************************************************************************00145400
                                                                            00145500
C                                                                           00145600
                                                                            00145700
C*************************************************************************00145800
C                            SECTION 4.1                                    00145900
C                      PRINT CLOSING INFORMATION                            00146000
C*************************************************************************00146100
C                                                                           00146200
      REWIND 9                                                              00146300
      REWIND 3                                                              00146400
```

```
      WRITE(6,8603)                                                     0014650
      WRITE(6,542) NOCYCC                                               0014660
      DO 538 I=1,NUMCON                                                 00146700
       IF(DMASS(I).EQ.0) GO TO 538                                      0014680
        WRITE(6,537) I,(DPMASS(J,I),J=1,NJ)                             0014690
538   CONTINUE                                                          00147000
      IF (IDATRF.NE.0) NBRCON=5                                         0014710
      CALL PLOTER                                                       0014720
C                                                                       00147300
C*********************************************************************00147400
C                              SECTION 4.2                              0014750
C                          FORMAT STATEMENTS                            0014760
C*********************************************************************00147700
C                                                                       0014780
C                                                                       0014790
C**** 4.2.1  FORMAT CARDS FOR READ STATEMENTS                           00148000
C                                                                       0014810
40    FORMAT(16I5)                                                      0014820
   42 FORMAT(16F5.0)                                                    00148300
62    FORMAT(45X,F5.0,I5,5F5.0)                                         00148400
   84 FORMAT(6I5,F10.0,5I5)                                             0014850
102   FORMAT(16X,16A4)                                                  0014860
  103 FORMAT(20A4)                                                      00148700
  110 FORMAT(5F10.0)                                                    0014880
  120 FORMAT(2I10,F10.0)                                                0014890
  184 FORMAT(7F10.0)                                                    00149000
  192 FORMAT(14I5)                                                      0014910
  200 FORMAT(I5,7F10.0)                                                 0014920
206   FORMAT (I1,1X,2A4,1X,A4,6F5.0,F10.0,5F5.0)                        0014930
221   FORMAT(15F5.0)                                                    00149400
  437 FORMAT(I5,10F5.0)                                                 0014950
  721 FORMAT(2I10,F10.0)                                                0014960
  728 FORMAT(2I10,2F10.0)                                               00149700
801   FORMAT(45X,7F5.0)                                                 0014980
 1152 FORMAT(I9,10X,F8.4)                                               0014990
5220  FORMAT(5(F5.0,2I5))                                               00150000
7000  FORMAT(2X,2A4,1X,A4,6F5.0,7I5)                                    00150100
7001  FORMAT(45X,I5,F10.0)                                              0015020
10001 FORMAT(5I5,10F5.0)                                                0015030
10003 FORMAT(I5,5X,I10,7I5)                                             00150400
20092 FORMAT(45X,2I5,3F5.0)                                             0015050
55001 FORMAT(45X,I5,6F5.0)                                              0015060
99073 FORMAT(45X,3F5.0,4I5)                                             00150700
99074 FORMAT (45X,2F5.0,I5)                                             0015080
99892 FORMAT(45X,7I5)                                                   0015090
C                                                                       00151000
C**** 4.2.2  FORMAT CARDS FOR WRITE STATEMENTS                          00151100
C                                                                       0015120
39    FORMAT(1H0///47X,19H THIS RUN CONSIDERS,I2,13H CONSTITUENTS////)  0015130
81    FORMAT(1H0////27X,'THE TEMPERATURE FROM CYCLE',I5,' THROUGH CYCLE'00151400
     *,I5,' IS',F5.1,' DEGREES C')                                      0015150
  105 FORMAT(1H0////                                                    0015160
     *  1H 20A4,14X,32H ENVIRONMENTAL PROTECTION AGENCY/                00151700
     *  1H 20A4,14X,28H DYNAMIC WATER QUALITY MODEL/                    0015180
     *       1H 20A4/1H 20A4////)                                       0015190
106   FORMAT(42X,42H ******** FROM HYDRAULICS PROGRAM ********/42X,     00152000
     *       42H START CYCLE   STOP CYCLE    TIME INTERVAL//42X,        00152100
     *        1H I7,I14,F12.0,9H  SECONDS/////)                         0015220
  107 FORMAT(121H STARTING CYCLE  INITIAL QUALITY  TOTAL QUALITY  DEPLET0015230
     1ION CORRECT TIME INTERVAL IN  START OF  START OF  DURATION  END OF00152400
     2/      119H ON HYD EXT TAPE      CYCLE          CYCLES          00015250
```

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     3PTION       QUALITY PROGRAM    FLOOD      EBB      OF FLOOD    EBB//00152600
     4   I10,I17,I16,I15,F17.3,6H HOURS,3I10,I8////)                    00152700
*19   FORMAT(1H0//50X,31H SUMMARY OF POINT SOURCE INPUTS//26X,20A4//)   00152800
  122 FORMAT(1H020A4)                                                   00152900
124    FORMAT(1H0//30X,65H MUNICIPAL AND INDUSTRIAL WASTEWATER AND TRIBU00153000
     CTARY INFLOW BY NODE//132H INPUT   NAME OF     TYPE OF  ! ******* FL00153100
     COW *******! UNADJUSTED CONC (MG/L) + ADJ. FACTORS !   ADJUSTED INP00153200
     CUT LOADS - 1000 LB/DAY  !/132H  NODE  DISCHARGE  DISCHARGE !    MG00153300
     CD        CFS   ! CONST1  CONST2  CONST3  CONST4  CONST5! CONST1  C00153400
     CONST2  CONST3  CONST4  CONST5!/6H -----,3X,7(1H-),4X,7(1H-),2X,2(200153500
     CH! ,9(1H-)),10(2H! ,6(1H-)),1H!/29X,2(1H!,10X),10(1H!,7X),1H!)    00153600
125    FORMAT(2X,I3,4X,2A4,4X,A4,4X,1H!,F10.2,1H!,10X,5(1H!,F7.2),5(1H!,700153700
     CX),1H!)                                                           00153800
 27    FORMAT(29X,1H!,10X,2H! ,9(1H-),5(1H!,7X),5(2H! ,6(1H-)),1H!/7X,11H00153900
     C NODE TOTAL,1X,2(10X,1H!),F10.2,5(1H!,7X),5(1H!,F7.2),1H!)        00154000
129    FORMAT (132(1H_))                                               00154100
 31    FORMAT(29X,1H!,10X,1H!,F10.2,10(1H!,F7.2),1H!)                  00154200
 36    FORMAT(1H1//43X,43HSUMMARY OF DISCHARGE LOADS BY ZONE AND TYPE//1100154300
     C6H INPUT    TYPE OF    NUMBER OF  !   ADJUSTED INPUT LOADS - 1000 00154400
     CLB/DAY    !  INPUT LOADS - PERCENT OF ZONE BY TYPE !/116H  ZONE   00154500
     CDISCHARGE  DISCHARGES  ! CONST1  CONST2  CONST3  CONST4  CONST5  !00154600
     C CONST1  CONST2  CONST3  CONST4  CONST5 !/1X,5(1H-),2(4X,7(1H-)),400154700
     CX,5(8H! ------),2X,5(8H! ------),2H !)                            00154800
 37    FORMAT(I5,6X,4H MUN,8X,F3.0,6X,5(1H!,F7.2),2X,5(1H!,F7.2),2H !/   00154900
     C       I5,6X,4H IND,8X,F3.0,6X,5(1H!,F7.2),2X,5(1H!,F7.2),2H !/   00155000
     C       I5,6X,4HTRIB,8X,F3.0,6X,5(1H!,F7.2),2X,5(1H!,F7.2),2H !)   00155100
 38    FORMAT(8X,21(1H ),2(1H!,10(1H )),10(1H!,7(1H )),1H!)             00155200
 39    FORMAT(32X,5(8H! ------),2X,5(8H! ------),2H !/7X,11H ZONE TOTAL,F00155300
     C8.0,6X,5(1H!,F7.2),2X,5(1H!,F7.2),2H !)                           00155400
*41    FORMAT(1H0,5X,12H GRAND TOTAL,F8.0,6X,5F8.2)                     00155500
 88    FORMAT  (1H0/52X,28H SEAWARD BOUNDARY CONDITIONS////49X,34H NODE 100155600
     1 : COURTHOUSE PT , MARYLAND//51X,18H ' CINI ' PERIOD =,I5,7H CYCLE00155700
     2S//34X,63H START    DURATION   CONST1   CONST2   CONST3   CONST4  00155800
     3 CONST5/34X,63H CYCLE    (CYCLES)   (MG/L)   (MG/L)   (MG/L)   (MG00155900
     4/L)   (MG/L)/35X,17H-----    --------,5(3X,6(1H-))/)               00156000
189    FORMAT(1H0///51X,30H NODE 2 : LISTON PT , DELAWARE//50X,20H ' CINM00156100
     1AX ' PERIOD =,I5,7H CYCLES//                                      00156200
     2   34X,63H START    DURATION   CONST1   CONST2   CONST3   CONST4  00156300
     3 CONST5/34X,63H CYCLE    (CYCLES)   (MG/L)   (MG/L)   (MG/L)   (MG00156400
     4/L)   (MG/L)/35X,17H-----    --------,5(3X,6(1H-))/)               00156500
  194 FORMAT(I5,2F8.0,F9.0,F8.3,F12.2,F10.1,I9,I6)                      00156600
  195 FORMAT(82X,I5,F9.1,F7.2,I7,4I5)                                   00156700
196    FORMAT(84H0 JUNCTION HEAD AND HYD. RADIUS AND X-SECTIONAL AREA OF 00156800
     *CHANNELS ARE AT MEAN TIDE **///                                   00156900
     *     132H*******************************    CHANNEL DATA    ********00157000
     **********************      **************    JUNCTION DATA    ****00157100
     **********/                                                        00157200
     *     132H CHAN.  LENGTH    WIDTH    AREA    MANNING  NET FLOW  HYD. 00157300
     *RADIUS  JUNC. AT ENDS      JUNC. INFLOW    HEAD   CHANNELS ENTERING00157400
     * JUNCTION//                                                       00157500
     * (I5,2F8.0,F9.0,F8.3,F12.2,F10.1,I9,I6,7X,I5,F9.1,F7.2,I7,4I5))   00157600
  198 FORMAT(1H1////                                                    00157700
     *     132H*************************************************     TABLE 00157800
     *F WASTE WATER RETURN FACTORS     ************************************00157900
     **********/                                                        00158000
     *      37H      JUNCTIONS USED   JUNCTIONS USED/                  00158100
     *     132H      FOR DIVERSIONS   FOR RET. FLOWS   1ST. CONSTITUENT 00158200
     *  2ND. CONSTITUENT   3RD. CONSTITUENT   4TH. CONSTITUENT   5TH. CO00158300
     *NSTITUENT/                                                        00158400
     *     132H UNIT  NO. 1  NO. 2     NO. 1  NO. 2    COEFF.    CONST. 00158500
     *  COEFF.    CONST.   COEFF.    CONST.   COEFF.    CONST.   COFFF. 00158600
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     *   CONST.//)                                                          00158700
  204 FORMAT(31HODATA CARD OUT OF SEQUENCE. JJ= I4,3H,J= I4)                00158800
  224 FORMAT(1HO/30X,62H  ADJUSTMENT FACTORS APPLIED TO OBTAIN STARTING     00158900
     *CONCENTRATIONS//                                                      00159000
     *   35X,51H CONSTITUENT    GROUP    FACTOR    JUNCTION NUMBERS)       00159100
228   FORMAT(1H //41X,I2,8X,I3,F11.2,I12,2H -,I4/                          00159200
     *(51X,I3,F11.2,I12,2H -,I4))                                           00159300
  241 FORMAT(1H0////                                                        00159400
     *     120H**************************************************    WATER 00159500
     *QUALITY DATA    **************************************************/  00159600
     *     120H                    * FIRST CONSTITUENT * SECOND CONSTITUENT00159700
     * * THIRD CONSTITUENT * FOURTH CONSTITUENT * FIFTH CONSTITUENT */     00159800
     *     118H                       INITIAL    INFLOW    INITIAL     INFLOW00159900
     *   INITIAL    INFLOW    INITIAL     INFLOW    INITIAL    INFLOW/     00160000
     *    119H JUNC.   INFLOW      CONC.      LOAD.    CONC.       LOAD.00160100
     *    CONC.      LOAD     CONC.       LOAD     CONC.      LOAD //)    00160200
  282 FORMAT(I4,F10.1,F12.2,2F10.2,F11.2,3F10.2,F11.2,2F10.2)               00160300
  395   FORMAT(1HO//55X,18H TRANSPORT FACTORS//40X,49H CHANNEL   VARYING A00160400
     CDVECTION    DIFFUSION FACTORS//42X,27HNUMBER  FLOOD TIDE EBB TIDE,00160500
     C5X,2HC4,4X,10H(A:SQMI/D)/43X,5H-----,4(4X,6(1H-))/)                   00160600
  397   FORMAT(1H ,43X,I3,2F10.2,1X,2F10.2)                                 00160700
  460 FORMAT(39H DEPLETION CORRECTION MADE AT JUNCTION I3,7H CYCLE I4,      00160800
     * 21H FOR CONSTITUENT NO. I1,12H. CONC. WAS F10.2)                     00160900
  474 FORMAT(36HOSUPERSATURATION OF CONSTITUENT NO. I1,23H PREVENTED AT     00161000
     *JUNCTION I4,7H CYCLE I4,10H CONC. WAS F10.2//)                        00161100
  478 FORMAT(34HOCONCENTRATION OF CONSTITUENT NO. I1,8H EXCEEDS,F7.1,       00161200
     * 13H IN JUNCTION I3,14H DUPING CYCLE I5,25H.   EXECUTION TERMINATE00161300
     *D.)                                                                   00161400
  481 FORMAT(1H 8F16.8)                                                     00161500
  518 FORMAT(1HO///47H RESTART DECK TAPE WAS LAST WRITTEN AFTER CYCLEI5/00161600
     *       50H HYDRAULIC CYCLE ON EXTRACT TAPE FOR RESTARTING = I5/      00161700
     *     8H NTAG = I3///)                                                00161800
  537   FORMAT(1HO///25X,'THE FOLLOWING DEPLETION CORRECTIONS (MG/L * CU F00161900
     1T) WERE ACCUMULATED FOR CONSTITUENT',I2//16(1X,10F13.0/))            00162000
  542 FORMAT(20HOEND OF QUALITY RUN.,I5,9H  CYCLES.)                        00162100
  806   FORMAT(1H //43X,26H THIS SIMULATION BEGINS AT,F6.2,6H HOURS/30X,28H00162200
     *H SUNRISE AND SUNSET OCCUR AT,F6.2,4H AND,F6.2,19H HOURS.RESPECTIV00162300
     *ELY///)                                                               00162400
 1160   FORMAT(1H1/////9X,26(1H*),' NOTES ON SPECIAL REACTION LINKAGES ', 00162500
     1   26(1H*)///)                                                       00162600
 1161 FORMAT(1H //16H CONSTITUENT NO.,I5,18H IS DECAYED WITH A,F5.1,15H 00162700
     *ORDER REACTION/)                                                     00162800
 1163 FORMAT(I9,10X,F8.4)                                                  00162900
 1164 FORMAT(1HO/////21X,77H             ***** TABLE OF TRANSFER COEFFICI00163000
     1ENTS AND FUNCTION OPERATORS *****//132H CNST(K) CO(1,K) CO(2,K) CO00163100
     2(3,K) CO(4,K) CO(5,K) FUNC1  FUNC2  FUNC3  FUNC4  FUNC5  FUNC6  FU00163200
     3NC7  FUNC8  FUNC9  FUNC10 FUNC11 FUNC12//)                           00163300
 1166 FORMAT(I4,F11.2,4F8.2,12F7.2/)                                       00163400
 1805   FORMAT(1H /71H THE DENITRIFICATION RATE (DNK) IS DETERMINED BY TEM00163500
     1P AND DO AS FOLLOWS/23H    FOR DO LEVELS ABOVE,F7.2,14H MG/L, DNK 00163600
     2= 0/25H    FOR DO LEVELS BETWEEN,F7.2,4H AND,F7.2,36H DNK INCREASE00163700
     3S LINEARLY FROM ZERO TO ,F7.3,5H /DAY/23H    FOR DO LEVELS BELOW,F00163800
     47.2,32H MG/L, DNK INCREASES LINEARLY TO,F7.2,5H /DAY/43H THETA USE00163900
     5D FOR TEMPERATURE CORRECTION IS  ,F5.3//)                             00164000
 2025   FORMAT(1HO//55X,18H TRANSPORT FACTORS//40X,49H CHANNEL   CONSTANT 00164100
     CADVECTION   DIFFUSION FACTORS//42X,6HNUMBER,6X,2HCU,8X,2HCD,8X,2HC00164200
     C4,4X,10H(M SQMI/D)/43X,5H-----,4(4X,6(1H-))/)                         00164300
 4667 FORMAT(1H ///12H CONSTITUENT,I5,38H IS TREATED AS CONSERVATIVE (NO00164400
     * DECAY)//)                                                           00164500
 4995   FORMAT(35X,I5,5X,I5,2X,5(2X,F7.2))                                00164600
 5228   FORMAT(1H1////40X,50H INFLOW ADJUSTMENT FACTORS FOR GROUPS OF JUNC00164700
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     CTIONS///12X,15H INFLOW VOLUMES,5X,37(1H*),23H INFLOW CONCENTRATION00164800
     CS ,37(1H*)//28H JUNCTION   ----- FLOW -----,96H---- CONST1 ----   00164900
     C ---- CONST2 ----     ---- CONST3 ----     ---- CONST4 ----     ---- 00165000
     CCONST5 ----/8H   GROUP,6(4X,6HFACTOR,5X,5HREACH)/9H   ------,12(3X00165100
     C,7H-------))                                                      00165200
 5230 FORMAT(4X,I2,4X,6(F9.3,I5,2H -,I3,1X))                            00165300
 9410 FORMAT(1H1////27X,'THE TEMPERATURE FROM CYCLE',I5,' THROUGH CYCLE'00165400
     *,I5,' IS',F5.1,' DEGREES C')                                      00165500
 7072 FORMAT(1H0,40X,4HNODE,I4,29H RECIEVES VARYING LOADS FROM ,        00165600
     1                    2A4,2H (,A4,1H)//54X,19H DISCHARGE PERIOD =,00165700
     2 I5,7H CYCLES//32X,' START    DURATION    FLOW    CONST1   CONST2 00165800
     3  CONST3   CONST4   CONST5'/32X,' CYCLE    (CYCLES)   (CFS)    (MG00165900
     4/L)   (MG/L)   (MG/L)   (MG/L)   (MG/L)'/32X,' -----    --------',00166000
     56('   ------'))                                                   00166100
 7078 FORMAT(1H ,31X,I5,6X,I5,2X,6F9.2)                                 00166200
 7079 FORMAT(1H0//52X,29H UPSTREAM BOUNDARY CONDITIONS/)                00166300
 9102 FORMAT(1H0//10X,'THE TOTAL MASS (TONS) FOR EACH CONSTITUENT AT CYC00166400
     1LE',I5,1X,'IS AS FOLLOWS'//8X,5F20.2)                             00166500
 8106 FORMAT(1H0/10X,'THE TOTAL MASS (TONS) DEPLETED FOR EACH CONSTITUEN00166600
     1T AS OF CYCLE',I5,1X,'IS AS FOLLOWS'//8X,5F20.2)                  00166700
 9576 FORMAT(1H0,25X,'SECTION 2.5',19X,'PRINT HYDRAULIC INPUTS')        00166800
 8600 FORMAT(1H1/132(1H*))                                              00166900
 9601 FORMAT(1H0/132(1H*))                                              00167000
 9602 FORMAT(132(1H*))                                                  00167100
 8603 FORMAT(1H1)                                                       00167200
 8604 FORMAT(1H0,25X,20A4)                                              00167300
 10004 FORMAT(1H1/30X,'THE FOLLOWING',I5,' JUNCTIONS HAVE TIME PLOTS'//' 00167400
     1 JUNCTION    STARTING CYCLE    ENDING CYCLE    CYCLE INTERVAL     00167500
     2CON1  CON2  CON3  CON4  CON5'/47X,'(1=PLOT    0=NO PLOT)')        00167600
 10006 FORMAT(1H ,I8,8X,I7,12X,I6,11X,I6,6X,5I6)                        00167700
  0441 FORMAT(//'       NO STATION TIME PLOTS REQUESTED    ')          00167800
11335 FORMAT(1H0//43X,42H DATA IS TRANSFORMED FOR OUTPUT AS FOLLOWS//32X00167900
     1,75H TRANSFORMATION       TRANSFORMED      TRANSF. FACTORS FOR OUT00168000
     2 CONSTITUENTS/20X,88HSEQUENCE       OPERATION          CONSTITUENTS00168100
     3     CONST1  CONST2  CONST3  CONST4  CONST5/20X,8(1H-),5X,14(1H-),00168200
     42X,2(4H    ,4H----),3X,5(2H  ,6(1H-)))                            00168300
 11336 FORMAT(1H /20X,I5,10X,9H ADDITION,11X,I1,7H  AND  ,I1,2X,5I8)    00168400
 11337 FORMAT(1H /20X,I5,8X,14HMULTIPLICATION,8X,13H1   -   5    ,5F8.2) 00168500
11338 FORMAT(1H /20X,I5,8X,14H LOG (BASE 10),8X,11H1   -   5  ,5I8)     00168600
 20031 FORMAT(1H0//47X,'NEW WIND SPEEDS (MPH)'/42X,'GROUP    WIND    JUNC00168700
     *TION NUMBERS'/42X,'-----   ------',6X,'---- ----')                00168800
20032 FORMAT(1H /25X,28H DAYTIME WIND VARIATION OF +,F4.1,14H MPH BEGINS00168900
     * AT,F6.2,11H O'CLOCK AM/23X,30H NIGHTTIME WIND VARIATION OF -,F4.100169000
     *,14H MPH BEGINS AT,F6.2,11H O'CLOCK PM)                           00169100
 84380 FORMAT(1H0,26X,20A4)                                             00169200
83474 FORMAT(//'   NO PROFILE TIME PLOTS REQUESTED    ')               00169300
 99075 FORMAT(1H /25X,22H SUNRISE NOW OCCURS AT,F6.2,6H HOURS/25X,17H SUN00169400
     *SET OCCURS AT,F6.2,6H HOURS)                                      00169500
99884 FORMAT(1H0//18X,12(1H*),42H RIVER MILES BELOW TRENTON FOR MODEL NO00169600
     *DES,12(1H*))                                                      00169700
 99885 FORMAT(1H ,10F10.2)                                              00169800
99886 FORMAT(1H ,I10,F10.2)                                             00169900
99888 FORMAT(F9.2,6X,5F10.2)                                            00170000
 12446 STOP                                                             00170100
      END                                                               00170200
C                                                                       00170300
C*************************************************************************00170400
C                                                                       00170500
C                       NETWORK SUBROUTINES                             00170600
C                                                                       00170700
C*************************************************************************00170800
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C                                                                       00170900
      SUBROUTINE RMILES                                                 00171000
      COMMON/WNF/RMNODE(160),FGSWO(99,5),FGSWA(99),IWFSCY,ICYC,IGCF(5), 00171100
     1 KSLACK,IWF,IWFFCY,INODOR(99),NMODE,NODERM(100,3)                 00171200
      NJ = 76 + 80*(NMODE-1)                                            00171300
C*******  1 AND 2-D MODEL NETWORK  *******                             00171400
      RMNODE(001) = 94.0                                                00171500
      RMNODE(002) = 84.8                                                00171600
      RMNODE(003) = 93.0                                                00171700
      RMNODE(004) = 92.0                                                00171800
      RMNODE(005) = 91.0                                                00171900
      RMNODE(006) = 90.0                                                00172000
      RMNODE(007) = 89.0                                                00172100
      RMNODE(008) = 88.0                                                00172200
      RMNODE(009) = 87.0                                                00172300
      RMNODE(010) = 86.0                                                00172400
      RMNODE(011) = 81.9                                                00172500
      RMNODE(012) = 78.9                                                00172600
      RMNODE(013) = 76.0                                                00172700
      RMNODE(014) = 86.0                                                00172800
      RMNODE(015) = 87.0                                                00172900
      RMNODE(016) = 88.0                                                00173000
      RMNODE(017) = 89.0                                                00173100
      RMNODE(018) = 74.0                                                00173200
      RMNODE(019) = 75.0                                                00173300
      RMNODE(020) = 73.2                                                00173400
      RMNODE(021) = 72.0                                                00173500
      RMNODE(022) = 70.8                                                00173600
      RMNODE(023) = 68.3                                                00173700
      RMNODE(024) = 65.7                                                00173800
      RMNODE(025) = 63.5                                                00173900
      GO TO (100,200),NMODE                                             00174000
C*******  1-D MODEL NETWORK  *******                                    00174100
100   CONTINUE                                                          00174200
      RMNODE(026) = 95.0                                                00174300
      RMNODE(027) = 96.0                                                00174400
      RMNODE(028) = 97.0                                                00174500
      RMNODE(029) = 98.0                                                00174600
      RMNODE(030) = 99.0                                                00174700
      RMNODE(031) = 61.6                                                00174800
      RMNODE(032) = 58.7                                                00174900
      RMNODE(033) = 56.5                                                00175000
      RMNODE(034) = 53.8                                                00175100
      RMNODE(035) = 53.0                                                00175200
      RMNODE(036) = 51.6                                                00175300
      RMNODE(037) = 50.0                                                00175400
      RMNODE(038) = 49.0                                                00175500
      RMNODE(039) = 48.0                                                00175600
      RMNODE(040) = 86.0                                                00175700
      RMNODE(041) = 45.0                                                00175800
      RMNODE(042) = 46.8                                                00175900
      RMNODE(043) = 44.4                                                00176000
      RMNODE(044) = 41.5                                                00176100
      RMNODE(045) = 87.0                                                00176200
      RMNODE(046) = 88.0                                                00176300
      RMNODE(047) = 89.0                                                00176400
      RMNODE(048) = 39.2                                                00176500
      RMNODE(049) = 36.7                                                00176600
      RMNODE(050) = 90.0                                                00176700
      RMNODE(051) = 34.4                                                00176800
      RMNODE(052) = 32.2                                                00176900
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      RMNODE(053) = 31.0                                                00177000
      RMNODE(054) = 91.0                                                00177100
      RMNODE(055) = 29.8                                                00177200
      RMNODE(056) = 28.0                                                00177300
      RMNODE(057) = 92.0                                                00177400
      RMNODE(058) = 26.0                                                00177500
      RMNODE(059) = 24.3                                                00177600
      RMNODE(060) = 22.3                                                00177700
      RMNODE(061) = 93.0                                                00177800
      RMNODE(062) = 20.6                                                00177900
      RMNODE(063) = 18.8                                                00178000
      RMNODE(064) = 17.0                                                00178100
      RMNODE(065) = 90.0                                                00178200
      RMNODE(066) = 15.2                                                00178300
      RMNODE(067) = 14.0                                                00178400
      RMNODE(068) = 13.1                                                00178500
      RMNODE(069) = 11.2                                                00178600
      RMNODE(070) =  8.9                                                00178700
      RMNODE(071) =  6.5                                                00178800
      RMNODE(072) =  4.8                                                00178900
      RMNODE(073) = 94.0                                                00179000
      RMNODE(074) =  3.2                                                00179100
      RMNODE(075) =  1.8                                                00179200
      RMNODE(076) =  0.5                                                00179300
      GO TO 300                                                         00179400
C******* 2-D MODEL NETWORK *******                                       00179500
200   CONTINUE                                                          00179600
      RMNODE(026) = 63.3                                                00179700
      RMNODE(027) = 61.0                                                00179800
      RMNODE(028) = 59.0                                                00179900
      RMNODE(029) = 56.8                                                00180000
      RMNODE(030) = 54.8                                                00160100
      RMNODE(031) = 53.3                                                00180200
      RMNODE(032) = 51.8                                                00180300
      RMNODE(033) = 50.3                                                00180400
      RMNODE(034) = 48.0                                                00180500
      RMNODE(035) = 47.0                                                00180600
      RMNODE(036) = 45.5                                                00180700
      RMNODE(037) = 44.5                                                00180800
      RMNODE(038) = 43.5                                                00180900
      RMNODE(039) = 42.5                                                00181000
      RMNODE(040) = 41.5                                                00181100
      RMNODE(041) = 40.4                                                00181200
      RMNODE(042) = 39.3                                                00181300
      RMNODE(043) = 38.3                                                00181400
      RMNODE(044) = 37.2                                                00181500
      RMNODE(045) = 36.3                                                00181600
      RMNODE(046) = 35.3                                                00181700
      RMNODE(047) = 34.0                                                00181800
      RMNODE(048) = 33.0                                                00181900
      RMNODE(049) = 32.0                                                00182000
      RMNODE(050) = 30.7                                                00182100
      RMNODE(051) = 29.8                                                00182200
      RMNODE(052) = 28.8                                                00182300
      RMNODE(053) = 27.8                                                00182400
      RMNODE(054) = 26.8                                                00182500
      RMNODE(055) = 25.8                                                00182600
      RMNODE(056) = 24.8                                                00182700
      RMNODE(057) = 23.8                                                00182800
      RMNODE(058) = 61.0                                                00182900
      RMNODE(059) = 59.0                                                00183000
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RMNODE(060) = 56.8                                                  00183100
RMNODE(061) = 54.8                                                  00183200
RMNODE(062) = 53.3                                                  00183300
RMNODE(063) = 51.8                                                  00183400
RMNODE(064) = 50.3                                                  00183500
RMNODE(065) = 48.8                                                  00183600
RMNODE(066) = 47.3                                                  00183700
RMNODE(067) = 45.5                                                  00183800
RMNODE(068) = 44.5                                                  00183900
RMNODE(069) = 43.5                                                  00184000
RMNODE(070) = 42.5                                                  00184100
RMNODE(071) = 41.5                                                  00184200
RMNODE(072) = 40.4                                                  00184300
RMNODE(073) = 39.3                                                  00184400
RMNODE(074) = 38.3                                                  00184500
RMNODE(075) = 37.2                                                  00184600
RMNODE(076) = 36.3                                                  00184700
RMNODE(077) = 35.3                                                  00184800
RMNODE(078) = 34.0                                                  00184900
RMNODE(079) = 33.0                                                  00185000
RMNODE(080) = 32.0                                                  00185100
RMNODE(081) = 30.7                                                  00185200
RMNODE(082) = 29.8                                                  00185300
RMNODE(083) = 28.8                                                  00185400
RMNODE(084) = 27.8                                                  00185500
RMNODE(085) = 26.8                                                  00185600
RMNODE(086) = 25.8                                                  00185700
RMNODE(087) = 24.8                                                  00185800
RMNODE(088) = 23.8                                                  00185900
RMNODE(089) = 63.3                                                  00186000
RMNODE(090) = 60.0                                                  00186100
RMNODE(091) = 59.0                                                  00186200
RMNODE(092) = 56.8                                                  00186300
RMNODE(093) = 54.8                                                  00186400
RMNODE(094) = 52.0                                                  00186500
RMNODE(095) = 51.0                                                  00186600
RMNODE(096) = 50.3                                                  00186700
RMNODE(097) = 48.8                                                  00186800
RMNODE(098) = 47.3                                                  00186900
RMNODE(099) = 45.5                                                  00187000
RMNODE(100) = 44.5                                                  00187100
RMNODE(101) = 42.5                                                  00187200
RMNODE(102) = 41.5                                                  00187300
RMNODE(103) = 39.3                                                  00187400
RMNODE(104) = 38.3                                                  00187500
RMNODE(105) = 37.2                                                  00187600
RMNODE(106) = 36.3                                                  00187700
RMNODE(107) = 35.3                                                  00187800
RMNODE(108) = 34.0                                                  00187900
RMNODE(109) = 33.0                                                  00188000
RMNODE(110) = 91.0                                                  00188100
RMNODE(111) = 32.0                                                  00188200
RMNODE(112) = 30.7                                                  00188300
RMNODE(113) = 29.8                                                  00188400
RMNODE(114) = 28.8                                                  00188500
RMNODE(115) = 27.8                                                  00188600
RMNODE(116) = 26.8                                                  00188700
RMNODE(117) = 25.8                                                  00188800
RMNODE(118) = 24.8                                                  00188900
RMNODE(119) = 23.8                                                  00189000
RMNODE(120) = 22.8                                                  00189100
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      RMNODE(121) = 21.8                                                    00189200
      RMNODE(122) = 20.5                                                    00189300
      RMNODE(123) = 18.8                                                    00189400
      RMNODE(124) = 17.8                                                    00189500
      RMNODE(125) = 16.5                                                    00189600
      RMNODE(126) = 15.3                                                    00189700
      RMNODE(127) = 14.3                                                    00189800
      RMNODE(128) = 14.0                                                    00189900
      RMNODE(129) = 13.3                                                    00190000
      RMNODE(130) = 12.0                                                    00190100
      RMNODE(131) = 10.8                                                    00190200
      RMNODE(132) =  9.8                                                    00190300
      RMNODE(133) =  8.5                                                    00190400
      RMNODE(134) =  7.5                                                    00190500
      RMNODE(135) =  8.0                                                    00190600
      RMNODE(136) =  6.5                                                    00190700
      RMNODE(137) =  5.3                                                    00190800
      RMNODE(138) =  4.3                                                    00190900
      RMNODE(139) =  2.8                                                    00191000
      RMNODE(140) =  1.5                                                    00191100
      RMNODE(141) =  0.5                                                    00191200
      RMNODE(142) = 95.0                                                    00191300
      RMNODE(143) = 96.0                                                    00191400
      RMNODE(144) = 97.0                                                    00191500
      RMNODE(145) = 98.0                                                    00191600
      RMNODE(146) = 99.0                                                    00191700
      RMNODE(147) = 86.0                                                    00191800
      RMNODE(148) = 87.0                                                    00191900
      RMNODE(149) = 88.0                                                    00192000
      RMNODE(150) = 89.0                                                    00192100
      RMNODE(151) = 91.0                                                    00192200
      RMNODE(152) = 92.0                                                    00192300
      RMNODE(153) = 93.0                                                    00192400
      RMNODE(154) = 90.0                                                    00192500
      RMNODE(155) = 94.0                                                    00192600
      RMNODE(156) = 90.0                                                    00192700
      GO TO 400                                                             00192800
 00   CONTINUE                                                              00192900
C*******  PRINT OUT 1-D MODEL NETWORK  *******                              00193000
      WRITE(6,1000)                                                         00193100
      WRITE(6,1001)                                                         00193200
      WRITE(6,1002)                                                         00193300
      WRITE(6,1003)                                                         00193400
      WRITE(6,1004)                                                         00193500
      WRITE(6,1005)((I,RMNODE(I)),I=01,66,13)                               00193600
      WRITE(6,1006)((I,RMNODE(I)),I=02,67,13)                               00193700
      WRITE(6,1007)((I,RMNODE(I)),I=03,68,13)                               00193800
      WRITE(6,1008)((I,RMNODE(I)),I=04,69,13)                               00193900
      WRITE(6,1009)((I,RMNODE(I)),I=05,70,13)                               00194000
      WRITE(6,1010)((I,RMNODE(I)),I=06,71,13)                               00194100
      WRITE(6,1011)((I,RMNODE(I)),I=07,72,13)                               00194200
      WRITE(6,1012)((I,RMNODE(I)),I=08,73,13)                               00194300
      WRITE(6,1013)((I,RMNODE(I)),I=09,74,13)                               00194400
      WRITE(6,1014)((I,RMNODE(I)),I=10,75,13)                               00194500
      WRITE(6,1015)((I,RMNODE(I)),I=11,76,13)                               00194600
      WRITE(6,1016)((I,RMNODE(I)),I=12,64,13)                               00194700
      WRITE(6,1017)((I,RMNODE(I)),I=13,65,13)                               00194800
      WRITE(6,1018)                                                         00194900
1000  FORMAT(1H1///101X,'DELAWARE'/102X,'RIVER',12X,'.---------.'/104X,     00195000
     1'!  ASSUNPINK  / TRENTON /'/104X,'76/   CR     .---------.'/105X,     00195100
     2'75'/105X,'74   CROSSWICKS'/87X,'NESHAMINY',10X,'72-73   CR')        00195200
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1001  FORMAT(1H ,16X,'DELAWARE ESTUARY',57X,'CR       69-70-71'/96X,'68' 00195300
     1/23X,'1-D',64X,'65    / !'/91X,'! 66-67'/18X,'MODEL NETWORK',56X,  00195400
     2'63-64/ !'/74X,'PENNYPACK  62       ASSISCUNK'/78X,'CR    /',12X,  00195500
     3'CR'/80X,'! 60-61'/77X,'58-59      RANCOCAS'/76X,'/',13X,'CR')      00195600
1002  FORMAT(1H ,59X,'SCHUYLKILL      56-57'/45X,'.',14(1H-),'. RIVER     00195700
     1/55/   PENNSAUKEN'/44X,'/ PHILADELPHIA /     !    52 !           CR'00195800
     2/43X,'.',14(1H-),'.      47   /  53'/62X,'46    51    54 COOPER R',4X00195900
     3,'.--------.'/54X,'DARBY     !    !',18X,'/ CAMDEN /')              00196000
1003  FORMAT(1H ,38X,'.---------.       CR      45    49-50 BIG TIMBER  .--00196100
     1------.'/38X,'/ CHESTER /',8X,'40      !    /',8X,'CR'/37X,'.-------00196200
     2--.CHESTER  !       44-48'/51X,'CR    39-41-43'/52X,'36-38--42/ !') 00196300
1004  FORMAT(1H ,50X,'/  37',8X,'MANTUA'/48X,'/-35-/',12X,'CR'/32X,'BRAN00196400
     1DYWINE    34'/34X,'RIVER      33',38X,'RIVER MILES FOR MODEL NETWOR00196500
     2K'/20X,'.',12(1H-),'.  !     32/ ! '/19X,'/ WILMINGTON /  30    /   00196600
     3 OLDMANS',18X,6('NODE  RM  ')/18X,'.',12(1H-),'.     !  31       CR'00196700
     4,21X,6('---- ---- '))                                               00196800
1005  FORMAT(1H ,31X,'27-26  /',29X,6(I4,F6.1))                           00196900
1006  FORMAT(1H ,16X,'CHRISTINA-29-28     !-25',29X,6(I4,F6.1))           00197000
1007  FORMAT(1H ,19X,'RIVER',13X,'!',30X,6(I4,F6.1))                      00197100
1008  FORMAT(1H ,36X,'24',30X,6(I4,F6.1))                                 00197200
1009  FORMAT(1H ,36X,'!',31X,6(I4,F6.1))                                  00197300
1010  FORMAT(1H ,35X,'23',31X,6(I4,F6.1))                                 00197400
1011  FORMAT(1H ,35X,'/',32X,6(I4,F6.1))                                  00197500
1012  FORMAT(1H ,33X,'22',9X,'17',22X,6(I4,F6.1))                         00197600
1013  FORMAT(1H ,31X,'21 !',10X,'!',22X,6(I4,F6.1))                       00197700
1014  FORMAT(1H ,6X,'COURTHOUSE',16X,'! 20!       16',22X,6(I4,F6.1))     00197800
1015  FORMAT(1H ,8X,'POINT',18X,'18  ! 19  15/  SALEM',17X,6(I4,F6.1))    00197900
1016  FORMAT(1H ,9X,'MD   1-3-4-5-6-7-8-9-10--13--14/     RIVER',17X,5     00198000
     1(I4,F6.1))                                                          00198100
1017  FORMAT(1H ,35X,'! /',30X,5(I4,F6.1))                                00198200
1018  FORMAT(1H ,17X,'C&D CANAL',8X,'12 '/35X,'!'/34X,'11'/35X,'!'/36X,   00198300
     1'2'/33X,'LISTON'/34X,'POINT')                                       00198400
      GO TO 500                                                           00198500
400   CONTINUE                                                            00198600
C*******  PRINT OUT 2-D MODEL NETWORK  *******                            00198700
      WRITE(6,2001)                                                       00198800
      WRITE(6,2002)                                                       00198900
      WRITE(6,2003)                                                       00199000
      WRITE(6,2004)                                                       00199100
      WRITE(6,2005)((I,RMNODE(I)),I=01,141,20)                            00199200
      WRITE(6,2006)((I,RMNODE(I)),I=02,142,20)                            00199300
      WRITE(6,2007)((I,RMNODE(I)),I=03,143,20)                            00199400
      WRITE(6,2008)((I,RMNODE(I)),I=04,144,20)                            00199500
      WRITE(6,2009)((I,RMNODE(I)),I=05,145,20)                            00199600
      WRITE(6,2010)((I,RMNODE(I)),I=06,146,20)                            00199700
      WRITE(6,2011)((I,RMNODE(I)),I=07,147,20)                            00199800
      WRITE(6,2012)((I,RMNODE(I)),I=08,148,20)                            00199900
      WRITE(6,2013)((I,RMNODE(I)),I=09,149,20)                            00200000
      WRITE(6,2014)((I,RMNODE(I)),I=10,150,20)                            00200100
      WRITE(6,2015)((I,RMNODE(I)),I=11,151,20)                            00200200
      WRITE(6,2016)((I,RMNODE(I)),I=12,152,20)                            00200300
      WRITE(6,2017)((I,RMNODE(I)),I=13,153,20)                            00200400
      WRITE(6,2018)((I,RMNODE(I)),I=14,154,20)                            00200500
      WRITE(6,2019)((I,RMNODE(I)),I=15,155,20)                            00200600
      WRITE(6,2020)((I,RMNODE(I)),I=16,156,20)                            00200700
      WRITE(6,2021)((I,RMNODE(I)),I=17,137,20)                            00200800
      WRITE(6,2022)((I,RMNODE(I)),I=18,138,20)                            00200900
      WRITE(6,2023)((I,RMNODE(I)),I=19,139,20)                            00201000
      WRITE(6,2024)((I,RMNODE(I)),I=20,140,20)                            00201100
2001  FORMAT(1H1,116X,'DELAWARE RIVER'/123X,'! ASNPNK'/109X,'.---------.00201200
     1   141- CR'/106X,' / TRENTON /     140 '/105X,' .---------.      100201300
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     239 '/125X,'138 '/13X,'  DELAWARE ESTUARY',49X,'                NESHA00201400
     3MINY ',20X,' 137155'/ 96X,' CR         130-131      134-136  / '/   00201500
     421X,'2-D',73X,' !         129   132-133 135   / '/ 96X,' 154     12700201600
     5 !',17X,'/'/16X,'MODEL NETWORK',69X,' !  126-128',11X,'CROSSWICKS'00201700
     6/79X,'  PENNYPACK     123124125    !',15X,'CR'/83X,' CR         122 00201800
     7       ASSISCUNK'/84X,' ! 57  121',14X,'CR'/78X,' 54-55-56  120---00201900
     8153'/76X,' 53          88 !   RANCOCAS '/75X,' 52  85-86-87  119    00202000
     9 CR ')                                                              00202100
2002  FORMAT(1H ,50X,' SCHUYLKILL          50-51  84         118 '/53X,' F00202200
     1IVER          49      83  115116117 '/56X,' !         48/  81-82   100202300
     214 '/36X,'.--------------.     150      47   80  112-113  152 '/34X,00202400
     3' / PHILADELPHIA /      /  **  /   79   111  /      PENNSAUKEN'/33X,00202500
     4' .--------------.       !  **  ! 78   109-110          CR'/53X,' 1400202600
     59     46  ! 108     ! ')                                             00202700
2003  FORMAT(1H ,53X,' /        ! 77 107     151 COOPER R '/54X,' !       400202800
     15  !  106',17X,'.--------.'/53X,' 148       ! 76   !',17X,'/ CAMDEN00202900
     2 /'/38X,' DARBY',11X,' !      44  !  105-156',11X,'.--------.'/16X,00203000
     3'.---------.',13X,' CR',12X,' !      43 75  !    BIG TIMBER'/15X,  00203100
     4'/ CHESTER /',14X,' !',12X,' 40-41-42  ! 104        CR '/14X,'.----00203200
     5-----.     CHESTER     147',9X,' 39',9X,'74  / '/31X,'CR          !   00203300
     6   37-38  71-72-73     /'/33X,'!   33-34-35-36      70         103') 00203400
2004  FORMAT(1H ,33X,'32/',11X,'68-69      102-/ '/32X,'31  64-65-66-67/ 00203500
     1     101'/30X,'30   63  96',9X,'100-/'/14X,'BRANDYWINE    29   62 00203600
     2  95-97-98-99/  !-MANTUA CR',13X,'RIVER MILES FOR MODEL NETWORK'/ 00203700
     316X,'RIVER      28   61   94'/3X,'.------------. !      27   60   9300203800
     4',14X,8(' NODE  RM ')/2X,'/ WILMINGTON / 146   /   59   92',16X,8 00203900
     5(' ---- ----'))                                                    00204000
 005  FORMAT(1H ,'.------------.     !  26 58   91',18X,8(I4,F6.1))       00204100
2006  FORMAT(1H ,13X,'143-142  ! /  90 !',18X,8(I4,F6.1))                00204200
2007  FORMAT(1H ,07X,'145-144      !--25-89   OLDMANS',12X,8(I4,F6.1))    00204300
 008  FORMAT(1H ,03X,'CHRISTINA',10X,'!',9X,'CR',15X,8(I4,F6.1))         00204400
 009  FORMAT(1H ,05X,'RIVER',11X,'24',26X,8(I4,F6.1))                    00204500
2010  FORMAT(1H ,21X,'!',27X,8(I4,F6.1))                                 00204600
 011  FORMAT(1H ,20X,'23',27X,8(I4,F6.1))                                00204700
 012  FORMAT(1H ,20X,'/',28X,8(I4,F6.1))                                 00204800
2013  FORMAT(1H ,18X,'22',9X,'17',18X,8(I4,F6.1))                        00204900
2014  FORMAT(1H ,16X,'21 !',10X,'!',18X,8(I4,F6.1))                      00205000
 015  FORMAT(1H ,17X,'! 20-!       18',18X,8(I4,F6.1))                   00205100
2016  FORMAT(1H ,16X,'18  ! 19  15/  SALEM',13X,8(I4,F6.1))              00205200
2017  FORMAT(1H ,18X,'>13--14/     RIVER',13X,8(I4,F6.1))                00205300
 018  FORMAT(1H ,'1-3-4-5-6-7-8-9-10  !',28X,8(I4,F6.1))                 00205400
 019  FORMAT(1H ,19X,'12',28X,8(I4,F6.1))                                00205500
2020  FORMAT(1H ,03X,'C&D CANAL',7X,'!',29X,8(I4,F6.1))                  00205600
2021  FORMAT(1H ,18X,'11',29X,7(I4,F6.1))                                00205700
 022  FORMAT(1H ,19X,'!',29X,7(I4,F6.1))                                 00205800
2023  FORMAT(1H ,20X,'2',28X,7(I4,F6.1))                                 00205900
2024  FORMAT(1H ,18X,'LISTON',25X,7(I4,F6.1)/20X,'POINT')                00206000
 00   CONTINUE                                                           00206100
C******* CONSTRUCT NODERM ARRAY FROM RMNODE ARRAY  *******               00206200
      K1=0                                                              00206300
      DO 550 J=1,NJ                                                     00206400
      L=RMNODE(J)+0.5                                                   00206500
      DO 520 K=1,3                                                      00206600
      IF(NODERM(L,K).GT.0) GO TO 520                                    00206700
      NODERM(L,K)=J                                                     00206800
      GO TO 530                                                         00206900
520   CONTINUE                                                          00207000
      K1=K1+1                                                           00207100
      IF(K1.GT.3) GO TO 600                                             00207200
      NODERM(100,K1)=J                                                  00207300
530   CONTINUE                                                          00207400
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550   CONTINUE                                                          00207500
      IF(K1.EQ.0) RETURN                                                00207600
      WRITE(6,575) (NODERM(100,K),K=1,3)                                00207700
575   FORMAT(1H0//9X,'THE FOLLOWING NODES WERE ASSIGNED RM 100 :',3I5)  00207800
      RETURN                                                            00207900
600   CONTINUE                                                          00208000
      WRITE(6,650)                                                      00208100
650   FORMAT(1H0//,15X,'MORE THAN 3 NODES HAD TO BE ASSIGNED RM 100')   00208200
      CALL EXIT                                                         00208300
      RETURN                                                            00208400
      END                                                               00208500
C                                                                       00208600
C*************************************************************************00208700
C                                                                       00208800
C                          TRANSPORT SUBROUTINES                        00208900
C                                                                       00209000
C*************************************************************************00209100
C                                                                       00209200
      SUBROUTINE LDISP(INOPT,NMODE)                                     00209300
      COMMON/DISPF/QIN(160),DIFFK(260)                                  00209400
      GO TO (100,200),INOPT                                             00209500
100   CONTINUE                                                          00209600
C SET VARYING DISPERSION FACTORS, BASED ON FRESHWATER INFLOW AT TRENTON 00209700
      READ(5,801) DIFF1,DIFF2,DIFF3,DIFF4,DIFF5                         00209800
801   FORMAT(45X,7F5.0)                                                 00209900
      ND3 = 0                                                           00210000
      ND5 = 0                                                           00210100
      ND7 = 0                                                           00210200
      ND9 = 0                                                           00210300
      NJL = 76                                                          00210400
      IF(NMODE.EQ.2) NJL = 141                                          00210500
      QFRSH = ABS(QIN(NJL))                                             00210600
      IF(QFRSH.LE.2000.) GO TO 8000                                     00210700
      IF(QFRSH.LE.3000.) GO TO 8001                                     00210800
      IF(QFRSH.LE.4000.) GO TO 8002                                     00210900
      IF(QFRSH.LE.5000.) GO TO 8003                                     00211000
      IF(QFRSH.LE.6000.) GO TO 8004                                     00211100
      IF(QFRSH.LE.7000.) GO TO 8005                                     00211200
      IF(QFRSH.LE.8000.) GO TO 8006                                     00211300
      IF(QFRSH.LE.9000.) GO TO 8007                                     00211400
      IF(QFRSH.LE.10000.) GO TO 8008                                    00211500
      IF(QFRSH.LE.11000.) GO TO 8009                                    00211600
      ND1 = 11                                                          00211700
      ND2 = 24                                                          00211800
      ND5 = 10                                                          00211900
      ND6 = 10                                                          00212000
      ND9 = 9                                                           00212100
      ND10 = 9                                                          00212200
      GO TO 8099                                                        00212300
8009  ND1 = 15                                                          00212400
      ND2 = 24                                                          00212500
      ND3 = 11                                                          00212600
      ND4 = 14                                                          00212700
      ND7 = 10                                                          00212800
      ND8 = 10                                                          00212900
      ND9 = 9                                                           00213000
      ND10 = 9                                                          00213100
      GO TO 8099                                                        00213200
8008  ND1 = 23                                                          00213300
      ND2 = 24                                                          00213400
      ND3 = 15                                                          00213500
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      ND4 = 22                                                          00213600
      ND5 = 11                                                          00213700
      ND6 = 14                                                          00213800
      ND9 = 9                                                           00213900
      ND10 = 10                                                         00214000
      GO TO 8099                                                        00214100
8007  ND1 = 25                                                          00214200
      ND2 = 25                                                          00214300
      ND3 = 23                                                          00214400
      ND4 = 24                                                          00214500
      ND5 = 12                                                          00214600
      ND6 = 22                                                          00214700
      ND7 = 11                                                          00214800
      ND8 = 11                                                          00214900
      ND9 = 9                                                           00215000
      ND10 = 10                                                         00215100
      GO TO 8099                                                        00215200
8006  ND1 = 26                                                          00215300
      ND2 = 26                                                          00215400
      ND3 = 23                                                          00215500
      ND4 = 25                                                          00215600
      ND5 = 12                                                          00215700
      ND6 = 22                                                          00215800
      ND7 = 11                                                          00215900
      ND8 = 11                                                          00216000
      ND9 = 9                                                           00216100
      ND10 = 10                                                         00216200
      GO TO 8099                                                        00216300
8005  ND1 = 27                                                          00216400
      ND2 = 27                                                          00216500
      ND3 = 25                                                          00216600
      ND4 = 26                                                          00216700
      ND5 = 12                                                          00216800
      ND6 = 24                                                          00216900
      ND7 = 20                                                          00217000
      ND8 = 20                                                          00217100
      ND9 = 9                                                           00217200
      ND10 = 11                                                         00217300
      GO TO 8099                                                        00217400
8004  ND1 = 33                                                          00217500
      ND2 = 34                                                          00217600
      ND3 = 25                                                          00217700
      ND4 = 28                                                          00217800
      ND5 = 12                                                          00217900
      ND6 = 24                                                          00218000
      ND7 = 20                                                          00218100
      ND8 = 20                                                          00218200
      ND9 = 9                                                           00218300
      ND10 = 11                                                         00218400
      IF(NMODE.EQ.1) GO TO 8099                                         00218500
      ND2 = 45                                                          00218600
      GO TO 8099                                                        00218700
8003  ND1 = 34                                                          00218800
      ND2 = 36                                                          00218900
      ND3 = 25                                                          00219000
      ND4 = 33                                                          00219100
      ND5 = 12                                                          00219200
      ND6 = 24                                                          00219300
      ND7 = 20                                                          00219400
      ND8 = 20                                                          00219500
      ND9 = 9                                                           00219600
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      ND10 = 11                                                         00219700
      IF(NMODE.EQ.1) GO TO 8099                                         00219800
      ND1 = 38                                                          00219900
      ND2 = 59                                                          00220000
      ND4 = 37                                                          00220100
      GO TO 8099                                                        00220200
 8002 ND1 = 35                                                          00220300
      ND2 = 39                                                          00220400
      ND3 = 25                                                          00220500
      ND4 = 34                                                          00220600
      ND5 = 12                                                          00220700
      ND6 = 24                                                          00220800
      ND7 = 20                                                          00220900
      ND8 = 20                                                          00221000
      ND9 = 9                                                           00221100
      ND10 = 11                                                         00221200
      IF(NMODE.EQ.1) GO TO 8099                                         00221300
      ND1 = 46                                                          00221400
      ND2 = 75                                                          00221500
      ND4 = 45                                                          00221600
      GO TO 8099                                                        00221700
 8001 ND1 = 37                                                          00221800
      ND2 = 52                                                          00221900
      ND3 = 25                                                          00222000
      ND4 = 36                                                          00222100
      ND5 = 12                                                          00222200
      ND6 = 24                                                          00222300
      ND7 = 20                                                          00222400
      ND8 = 20                                                          00222500
      ND9 = 9                                                           00222600
      ND10 = 11                                                         00222700
      IF(NMODE.EQ.1) GO TO 8099                                         00222800
      ND1 = 62                                                          00222900
      ND2 = 125                                                         00223000
      ND4 = 61                                                          00223100
      GO TO 8099                                                        00223200
 8000 ND1 = 44                                                          00223300
      ND2 = 63                                                          00223400
      ND3 = 25                                                          00223500
      ND4 = 43                                                          00223600
      ND5 = 12                                                          00223700
      ND6 = 24                                                          00223800
      ND7 = 20                                                          00223900
      ND8 = 20                                                          00224000
      ND9 = 9                                                           00224100
      ND10 = 11                                                         00224200
      IF(NMODE.EQ.1) GO TO 8099                                         00224300
      ND1 = 88                                                          00224400
      ND2 = 201                                                         00224500
      ND4 = 87                                                          00224600
 8099 DO 8100 N=ND1,ND2                                                 00224700
 8100 DIFFK(N) = DIFF1                                                  00224800
      IF(ND3.EQ.0) GO TO 8200                                           00224900
      DO 8101 N=ND3,ND4                                                 00225000
 8101 DIFFK(N) = DIFF2                                                  00225100
 8200 IF(ND5.EQ.0) GO TO 8201                                           00225200
      DO 8102 N=ND5,ND6                                                 00225300
 8102 DIFFK(N) = DIFF3                                                  00225400
 8201 IF(ND7.EQ.0) GO TO 8202                                           00225500
      DO 8103 N=ND7,ND8                                                 00225600
 8103 DIFFK(N) = DIFF4                                                  00225700
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 8202 IF(ND9.EQ.0) GO TO 8203                                          00225800
      DO 8104 N=ND9,ND10                                               00225900
 8104 DIFFK(N) = DIFF5                                                 00226000
 8203 CONTINUE                                                         00226100
      DIFFK(1) = 20.                                                   00226200
      DIFFK(2) = 30.                                                   00226300
      DIFFK(3) = 40.                                                   00226400
      DIFFK(4) = 50.                                                   00226500
      DIFFK(5) = 60.                                                   00226600
      DIFFK(6) = 70.                                                   00226700
      DIFFK(7) = 80.                                                   00226800
      DIFFK(8) = 90.                                                   00226900
      RETURN                                                           00227000
 200  CONTINUE                                                         00227100
      RETURN                                                           00227200
      END                                                              00227300
C                                                                      00227400
C***********************************************************************00227500
C                                                                      00227600
C                          WASTE LOAD SUBROUTINES                      00227700
C                                                                      00227800
C***********************************************************************00227900
C                                                                      00228000
      SUBROUTINE CWASTE(INOPT,NUMCON,NJ,NZ1,NZ2)                       00228100
      COMMON NSPEC,DELTQ,DUMMI(9)                                      00228200
      COMMON/ALPH/ALPHA(220),BLANKF(20)                                00228300
      COMMON/GROUP/MGROUP(6),LGROUP(4),NGROUP(5)                       00228400
      COMMON/DPRINT/KDELP1,KDELP2,KDELP3,KDELPC,KDELP4,KDELP5,KDELP6,  00228500
     1  KDELP8,KDELP9                                                  00228600
      COMMON/CWTABL/NZTDIS(6,4),ZTLOAD(5,6,4),ZTPCT(5,6,4),NZDIS(6),   00228700
     1ZLOAD(5,6),ZPCT(5,6),NDIS,CWLOAD(5),NTYPE,NZ                     00228800
      COMMON/CINPUT/CSPEC(160,5),QINWQ(160),CRF(6),                    00228900
     1 WFLO(2,10),WCON(5,10),WLOAD(5,10),DELTQ1                        00229000
      DIMENSION VOLQIN(160)                                            00229100
      EQUIVALENCE (QINWQ,VOLQIN)                                       00229200
      GO TO (100,200,300,400),INOPT                                    00229300
 100  CONTINUE                                                         00229400
C*******  INITIALIZE ARRAYS  *******                                   00229500
      KDELPC=1                                                         00229600
      DO 123 J=1,NJ                                                    00229700
      QINWQ(J)=0.0                                                     00229800
      DO 121 I=1,NUMCON                                                00229900
      CSPEC(J,I)=0.0                                                   00230000
 121  CONTINUE                                                         00230100
 123  CONTINUE                                                         00230200
      DO 127 NZ=1,6                                                    00230300
      NZDIS(NZ)=0.0                                                    00230400
      DO 126 NT=1,4                                                    00230500
      NZTDIS(NZ,NT)=0.0                                                00230600
      DO 125 I=1,NUMCON                                                00230700
      ZTLOAD(I,NZ,NT)=0.0                                              00230800
 125  CONTINUE                                                         00230900
 126  CONTINUE                                                         00231000
 127  CONTINUE                                                         00231100
      DO 129 I=1,NUMCON                                                00231200
      CWLOAD(I)=0.0                                                    00231300
      DO 128 NZ=1,6                                                    00231400
      ZLOAD(I,NZ)=0.0                                                  00231500
 128  CONTINUE                                                         00231600
 129  CONTINUE                                                         00231700
      NDIS=0                                                           00231800
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200   CONTINUE                                                          00231900
      WFLO(1,1)=0.0                                                     00232000
      DO 201 I=1,NUMCON                                                 00232100
      WLOAD(I,1)=0.0                                                    00232200
201   CONTINUE                                                          00232300
C*******  PRINT HEADING FOR CONSTANT WW TABLE  *******                  00232400
      IF(KDELP3.NE.0) GO TO 208                                         00232500
      WRITE(6,119) (ALPHA(I),I=61,80)                                   00232600
      DO 205 K=1,NUMCON                                                 00232700
      K1 = 101 + 20 * K                                                 00232800
      K2 = K1 + 19                                                      00232900
      WRITE(6,64380) (ALPHA(I),I=K1,K2)                                 00233000
205   CONTINUE                                                          00233100
      WRITE(6,124)                                                      00233200
208   CONTINUE                                                          00233300
C*******  INPUT 'ND' DISCHARGES FOR NODE JJ  *******                    00233400
211    CONTINUE                                                         00233500
      READ(5,192) JJ,ND,NZ                                              00233600
      IF(JJ.EQ.0) GO TO 210                                             00233700
      KDELPC=0                                                          00233800
      J=JJ                                                              00233900
      DO 215 K=1,ND                                                     00234000
      READ(5,206)NTYPE,(ALPHA(I),I=1,3),CRF(6),(CRF(I),I=1,5),WFLO(1,K),00234100
     1           (WCON(I,K),I=1,5)                                      00234200
      WFLO(1,K) = WFLO(1,K) * CRF(6)                                    00234300
      WFLO(2,K) = WFLO(1,K) / 1.55                                      00234400
C*******  ACCUMULATE INFLOW FOR NODE  *******                           00234500
      QINWQ(J) = QINWQ(J) + WFLO(1,K)                                   00234600
C*******  NUMBER OF DISCHARGES BY ZONE AND TYPE  *******                00234700
      NZTDIS(NZ,NTYPE) = NZTDIS(NZ,NTYPE) + 1                           00234800
      DO 202 I=1,NUMCON                                                 00234900
C*******  APPLY ZONED REDUCTION FACTORS  *******                        00235000
      WCONIK = WCON(I,K)                                                00235100
      IF(LGROUP(NTYPE).NE.0) CALL WWADJ(3,NUMCON,NJ,WCONIK,I,JJ)        00235200
      WCON(I,K) = WCONIK                                                00235300
C*******  ADJUSTED INPUT LOADS, INTERNAL UNITS  *******                 00235400
      WLOAD(I,K) = WCON(I,K) * WFLO(1,K) * CRF(1)                       00235500
C*******  LOADS IN 1000 LB/DAY  *******                                 00235600
      WLOAD(I,K) =-WLOAD(I,K) * 0.005385                                00235700
C*******  ACCUMULATE LOAD FOR NODE IN 1000 LB/DAY  *******              00235800
      CSPEC(J,I) = CSPEC(J,I) + WLOAD(I,K)                              00235900
C******* LOADS BY ZONE AND TYPE IN 1000 LB/DAY  *******                 00236000
      ZTLOAD(I,NZ,NTYPE) = ZTLOAD(I,NZ,NTYPE) + WLOAD(I,K)              00236100
C*******  TOTAL LOAD IN 1000 LB/DAY  *******                            00236200
      CWLOAD(I) = CWLOAD(I) + WLOAD(I,K)                                00236300
202   CONTINUE                                                          00236400
      IF(KDELP3.NE.0) GO TO 215                                         00236500
C*******  PRINT INDIVIDUAL ENTRIES IN TABLE  *******                    00236600
      WRITE(6,225) JJ,(ALPHA(I),I=1,3),WFLO(2,K),(WCON(I,K),I=1,5)      00236700
      WRITE(6,131) WFLO(1,K),(CRF(I),I=1,5),(WLOAD(I,K),I=1,5)          00236800
215   CONTINUE                                                          00236900
C*******  PRINT NODE TOTALS FOR TABLE  *******                          00237000
      IF (KDELP3.NE.0) GO TO 218                                        00237100
      WRITE(6,227) QINWQ(J),(CSPEC(J,I),I=1,5)                          00237200
      WRITE(6,229)                                                      00237300
218   CONTINUE                                                          00237400
      GO TO 211                                                         00237500
210   CONTINUE                                                          00237600
      RETURN                                                            00237700
300   CONTINUE                                                          00237800
C*******  READ RESTART CSPEC ON UNIT 8 *******                          00237900
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      IF(KDELP3.NE.2) GO TO 306                                          00238000
      DO 305 J=1,NJ                                                      00238100
      DO 304 I=1,NUMCON                                                  00238200
      READ(8) DUMMY                                                      00238300
304   CONTINUE                                                           00238400
      READ(8) DUMMY                                                      00238500
305   CONTINUE                                                           00238600
      RETURN                                                             00238700
306   CONTINUE                                                           00238800
      READ(8) (VOLQIN(J),(CSPEC(J,I),I=1,NUMCON),J=1,NJ)                 00238900
      DO 320 J=1,NJ                                                      00239000
      QINWQ(J) = VOLQIN(J) / DELTQ                                       00239100
      DO 310 I=1,NUMCON                                                  00239200
      CSPEC(J,I) = CSPEC(J,I) * 0.005385 / DELTQ                         00239300
310   CONTINUE                                                           00239400
320   CONTINUE                                                           00239500
      KDELPC = 1                                                         00239600
      RETURN                                                             00239700
400   CONTINUE                                                           00239800
C*******  ACCUMULATE LOADS AND CALCULATE PERCENTAGES BY ZONE  *******    00239900
      DO 425 NZ=NZ1,NZ2                                                  00240000
      DO 410 NTYPE=1,3                                                   00240100
      NZDIS(NZ) = NZDIS(NZ) + NZTDIS(NZ,NTYPE)                           00240200
      DO 405 I=1,NUMCON                                                  00240300
      ZLOAD(I,NZ) = ZLOAD(I,NZ) + ZTLOAD(I,NZ,NTYPE)                     00240400
405   CONTINUE                                                           00240500
410   CONTINUE                                                           00240600
      DO 420 NTYPE=1,3                                                   00240700
      DO 415 I=1,NUMCON                                                  00240800
      IF (ZLOAD(I,NZ).EQ.0.0) GO TO 415                                  00240900
      ZTPCT(I,NZ,NTYPE) = ZTLOAD(I,NZ,NTYPE) * 100.0 / ZLOAD(I,NZ)       00241000
      ZPCT(I,NZ) = ZLOAD(I,NZ) * 100.0 / CWLOAD(I)                       00241100
415   CONTINUE                                                           00241200
420   CONTINUE                                                           00241300
      NDIS = NDIS + NZDIS(NZ)                                            00241400
425   CONTINUE                                                           00241500
C*******  PRINT SUMMARY TABLE  *******                                   00241600
      WRITE(6,136)                                                       00241700
      DO 440 NZ=NZ1,NZ2                                                  00241800
      WRITE(6,137)((NZ,NZTDIS(NZ,NTYPE),(ZTLOAD(I,NZ,NTYPE),I=1,5),      00241900
     1             (ZTPCT(I,NZ,NTYPE),I=1,5)),NTYPE=1,3)                 00242000
      WRITE(6,139) NZDIS(NZ),(ZLOAD(I,NZ),I=1,5),(ZPCT(I,NZ),I=1,5)      00242100
      WRITE(6,130)                                                       00242200
440   CONTINUE                                                           00242300
      WRITE(6,141) NDIS,(CWLOAD(I),I=1,5)                                00242400
      WRITE(6,130)                                                       00242500
      RETURN                                                             00242600
  192 FORMAT(14I5)                                                       00242700
206   FORMAT (I1,1X,2A4,1X,A4,6F5.0,F10.0,5F5.0)                         00242800
119   FORMAT(1H0//50X,31H SUMMARY OF POINT SOURCE INPUTS//26X,20A4//)    00242900
124    FORMAT(1H0//30X,65H MUNICIPAL AND INDUSTRIAL WASTEWATER AND TRIBU00243000
     CTARY INFLOW BY NODE//132H INPUT   NAME OF    TYPE OF  ! ******* FL00243100
     COW *******! UNADJUSTED CONC (MG/L) + ADJ. FACTORS !   ADJUSTED INP00243200
     CUT LOADS - 1000 LB/DAY  !/132H  NODE  DISCHARGE  DISCHARGE !    MG00243300
     CD        CFS   ! CONST1  CONST2  CONST3  CONST4  CONST5! CONST1  C00243400
     CONST2  CONST3  CONST4  CONST5!/6H -----,3X,7(1H-),4X,7(1H-),2X,2(200243500
     CH! ,9(1H-)),10(2H! ,6(1H-)),1H!/29X,2(1H!,10X),10(1H!,7X),1H!)    00243600
225   FORMAT(2X,I3,4X,2A4,4X,A4,4X,1H!,F10.2,1H!,10X,5(1H!,F7.2),5(1H!,700243700
     CX),1H!)                                                           00243800
227   FORMAT(29X,1H!,10X,2H! ,9(1H-),5(1H!,7X),5(2H! ,6(1H-)),1H!/7X,11H00243900
     C NODE TOTAL,1X,2(10X,1H!),F10.2,5(1H!,7X),5(1H!,F7.2),1H!)        00244000
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130   FORMAT (132(1H_))                                                        00244100
131   FORMAT(29X,1H!,10X,1H!,F10.2,10(1H!,F7.2),1H!)                           00244200
136   FORMAT(1H1/////48X,43HSUMMARY OF DISCHARGE LOADS BY ZONE AND TYPE/00244300
     1///5X,116H INPUT    TYPE OF    NUMBER OF  !   ADJUSTED INPUT LOADS00244400
     2 - 1000 LB/DAY    !  INPUT LOADS - PERCENT OF ZONE BY TYPE !/5X,  00244500
     3 116H  ZONE   DISCHARGE  DISCHARGES  ! CONST1  CONST2  CONST3  CON00244600
     4ST4  CONST5  ! CONST1  CONST2  CONST3  CONST4  CONST5 !/6X,5(1H-),00244700
     52(4X,7(1H-)),4X,5(8H! ------),2X,5(8H! ------),2H !)                00244800
137   FORMAT(110,6X,4H MUN,8X,I3,6X,5(1H!,F7.2),2X,5(1H!,F7.2),2H !/       00244900
     1       I10,6X,4H IND,8X,I3,6X,5(1H!,F7.2),2X,5(1H1,F7.2),2H !/      00245000
     2       I10,6X,4HTRIB,8X,I3,6X,5(1H!,F7.2),2X,5(1H1,F7.2),2H !)      00245100
139   FORMAT(37X,5(8H! ------),2X,5(8H! ------),2H !/12X,11H ZONE TOTAL,00245200
     1 I8,6X,5(1H!,F7.2),2X,5(1H!,F7.2),2H !)                             00245300
141   FORMAT(1H0,10X,12H GRAND TOTAL,I8,6X,5F8.2)                          00245400
229   FORMAT(132(1H-))                                                     00245500
64380 FORMAT(1H0,26X,20A4)                                                 00245600
      END                                                                  00245700
      SUBROUTINE VWASTE(INOPT,NUMCON,NJVDIS,NZ1,NZ2)                       00245800
      INTEGER TCOUNT,TCZ,TCZT                                              00245900
      COMMON/ALPH/ALPHA(220),BLANKE(20)                                    00246000
      COMMON/VWLOAD/CON(5,75,35),FLO(75,35),INCF(75,35),NJVD(75),          00246100
     1 NINCF(75),NPERF(75),NTYS(75),NZSN(75),KCLF(75),KFK(75)              00246200
      COMMON/VWTABL/TCZT(6,4),TLKZT(5,6,4),ZCON(5,6,4),TCZ(6),             00246300
     1 TLKZ(5,6),ZCON1(5,6),TCOUNT,TLBS(5),ISAN,ISIN,ININ,IRUN            00246400
      COMMON/GROUP/MGROUP(6),LGROUP(4),NGROUP(5)                           00246500
      COMMON/CINPUT/CSPEC(160,5),QINWQ(160),CRF(6),                        00246600
     1 WFLO(2,10),WCON(5,10),WLOAD(5,10),DELTQ1                           00246700
      COMMON/CWTABL/NZTDIS(6,4),ZTLOAD(5,6,4),ZTPCT(5,6,4),NZDIS(6),       00246800
     1ZLOAD(5,6),ZPCT(5,6),NDIS,CWLOAD(5),NTYPE,NZ                         00246900
      GO TO (100,200,300,400),INOPT                                        00247000
100   CONTINUE                                                             00247100
C*******  INITIALIZE NUMBER OF DISCHARGES TO CONSTANT WW TOTAL  *******    00247200
      DO 110 NZ=1,6                                                        00247300
      TCZT(NZ,4) = 0                                                       00247400
      DO 105 NT=1,3                                                        00247500
      TCZT(NZ,NT) = NZTDIS(NZ,NT)                                          00247600
105   CONTINUE                                                             00247700
110   CONTINUE                                                             00247800
      WRITE(6,7071)                                                        00247900
      WRITE(6,129)                                                         00248000
8699  CONTINUE                                                             00248100
C*******  READ AND STORE VARYING INFLOWS AND CONCENTRATIONS  *******       00248200
      NPAGE = 6                                                            00248300
      DO 7099 J=1,NJVDIS                                                   00248400
      READ(5,7000) (ALPHA(I),I=1,3),CRF(6),(CRF(I),I=1,5),NJVD(J),         00248500
     1  NINCF (J),NPERF(J),NTYS(J),NZSN(J)                                 00248600
      TCZT(NZSN(J),NTYS(J))=TCZT(NZSN(J),NTYS(J))+1                        00248700
      KCLF(J)=1                                                            00248800
      KFK(J)=0                                                             00248900
      KKK=NINCF(J)                                                         00249000
      READ (5,7017)(INCF(J,K),FLO(J,K),(CON(I,J,K),I=1,5),K=1,KKK)         00249100
      DO 7003 K=1,KKK                                                      00249200
      FLO(J,K)=FLO(J,K)*CRF(6)                                             00249300
      DO 7004 I=1,NUMCON                                                   00249400
      CON(I,J,K)=CON(I,J,K)*CRF(I)                                         00249500
      JJ = NJVD(J)                                                         00249600
      CONIJK = CON(I,J,K)                                                  00249700
      IF(LGROUP(NTYS(J)).NE.0) CALL WWADJ(3,NUMCON,NJ,CONIJK,I,JJ)         00249800
      CON(I,J,K) = CONIJK                                                  00249900
7004  CONTINUE                                                             00250000
7003  CONTINUE                                                             00250100
```

```
C*******  PRINT VARYING INFLOWS AND CONCENTRATIONS  *******                00250200
      NPAGE = NPAGE + 9 + KKK                                              00250300
      IF(NPAGE.LE.60) GO TO 150                                            00250400
      WRITE(6,8603)                                                        00250500
      NPAGE = 9 + KKK                                                      00250600
150   CONTINUE                                                             00250700
      WRITE(6,7072)NJVD(J),NZSN(J),NTYS(J),(ALPHA(I),I=1,3),NPERF(J)       00250800
      II=1                                                                 00250900
      III=0                                                                00251000
      KKK=NINCF(J)                                                         00251100
      DO 7085 K=1,KKK                                                      00251200
      II=II+III                                                            00251300
      WRITE(6,7078) II,INCF(J,K),FLO(J,K),(CON(I,J,K),I=1,NUMCON)          00251400
      III=INCF(J,K)                                                        00251500
7085  CONTINUE                                                             00251600
      WRITE(6,129)                                                         00251700
7099  CONTINUE                                                             00251800
      RETURN                                                               00251900
200   CONTINUE                                                             00252000
      IMARK=ISAN                                                           00252100
C*******  INITIALIZE TABLE TO CONSTANT WW TOTALS  *******                  00252200
      DO 11500 IK=1,ININ                                                   00252300
      TCOUNT = 0                                                           00252400
      DO 11050 J=1,5                                                       00252500
      TLBS(J) = CWLOAD(J)                                                  00252600
      DO 11050 K=1,5                                                       00252700
      TCZ(K) = 0                                                           00252800
      TLKZ(J,K)=0.                                                         00252900
      DO 11051 JJ=1,3                                                      00253000
      TLKZT(J,K,JJ) = ZTLOAD(J,K,JJ)                                       00253100
11051 CONTINUE                                                             00253200
      TLKZT(J,K,4)=0.                                                      00253300
11050 CONTINUE                                                             00253400
C*******  ACCUMULATE VARYING LOADS OVER AVERAGING PERIOD  *******          00253500
C*******          AND ADD TO CONSTANT WW TOTALS           *******          00253600
      IMART=IMARK                                                          00253700
      DO 11510 JJ=1,ISIN                                                   00253800
      IMARK=IMARK+1                                                        00253900
      DO 11501 J=1,NJVDIS                                                  00254000
      III=0                                                                00254100
      II=1                                                                 00254200
      KKK=NINCF(J)                                                         00254300
      KMARK=KKK                                                            00254400
      IF (KMARK.EQ.1)GO TO 11506                                           00254500
C*******  FIND DISCHARGE PERIOD CORRESPONDING TO CYCLE IMARK  *******      00254600
      DO 11505 K=1,KKK                                                     00254700
      II=II+III                                                            00254800
      IF(II.LT.IMARK)GO TO 11505                                           00254900
      KMARK=K                                                              00255000
      GO TO 11506                                                          00255100
11505 III=INCF(J,K)                                                        00255200
      GO TO 11501                                                          00255300
11506 NNZ=NZSN(J)                                                          00255400
      NT=NTYS(J)                                                           00255500
      DO 11515 K=1,NUMCON                                                  00255600
      TLBS(K)=TLBS(K)-.005385*FLO(J,KMARK)*CON(K,J,KMARK)/FLOAT(ISIN)      00255700
      TLKZT(K,NNZ,NT)=TLKZT(K,NNZ,NT) -.005385*FLO(J,KMARK)*CON(K,J,KMAR00255800
     1K)/FLOAT(ISIN)                                                       00255900
11515 CONTINUE                                                             00256000
11501 CONTINUE                                                             00256100
11510 CONTINUE                                                             00256200
```

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C*******  COMPUTE TOTAL LOADS AND PCT'S BY ZONE AND TYPE  *******          00256300
      DO 11135 NZ=NZ1,NZ2                                                 00256400
      DO 11132 II=1,5                                                     00256500
      DO 11131 III=1,4                                                    00256600
      TLKZ(II,NZ)=TLKZ(II,NZ)+TLKZT(II,NZ,III)                           00256700
11131 CONTINUE                                                            00256800
11132 CONTINUE                                                            00256900
      DO 11134 III=1,4                                                    00257000
      TCZ(NZ)=TCZ(NZ)+TCZT(NZ,III)                                        00257100
      DO 11133 II=1,NUMCON                                                00257200
      ZCON(II,NZ,III)=TLKZT(II,NZ,III)*100./TLKZ(II,NZ)                   00257300
      ZCON1(II,NZ)=TLKZ(II,NZ)*100./TLBS(II)                              00257400
11133 CONTINUE                                                            00257500
11134 CONTINUE                                                            00257600
      TCOUNT=TCOUNT+TCZ(NZ)                                               00257700
11135 CONTINUE                                                            00257800
C*******  PRINT SUMMARY OF ALL LOADS BY ZONE AND TYPE  *******            00257900
      WRITE(6,136)                                                        00258000
      DO 11140 NZ=NZ1,NZ2                                                 00258100
      WRITE(6,137)(NZ,TCZT(NZ,K),(TLKZT(I,NZ,K),I=1,5),(ZCON(I,NZ,K),     00258200
     1I=1,5),K=1,4)                                                       00258300
      WRITE(6,139)TCZ(NZ),(TLKZ(I,NZ),I=1,5),(ZCON1(I,NZ),I=1,5)          00258400
      WRITE(6,129)                                                        00258500
11140 CONTINUE                                                            00258600
      WRITE(6,141)TCOUNT,(TLBS(I),I=1,5)                                  00258700
      WRITE(6,129)                                                        00258800
      IMART1 = IMART + 1                                                  00258900
      WRITE(6,510) IMART1,IMARK                                           00259000
11500 CONTINUE                                                            00259100
      IF(IRUN.GT.0)STOP                                                   00259200
      RETURN                                                              00259300
300   CONTINUE                                                            00259400
      RETURN                                                              00259500
400   CONTINUE                                                            00259600
      RETURN                                                              00259700
129   FORMAT (132(1H_))                                                   00259800
136   FORMAT(1H1/////48X,43HSUMMARY OF DISCHARGE LOADS BY ZONE AND TYPE/00259900
     1///5X,116H INPUT    TYPE OF    NUMBER OF  !   ADJUSTED INPUT LOADS00260000
     2 - 1000 LB/DAY    !  INPUT LOADS - PERCENT OF ZONE BY TYPE !/5X,  00260100
     3 116H  ZONE   DISCHARGE  DISCHARGES  ! CONST1  CONST2  CONST3  CON00260200
     4ST4  CONST5  ! CONST1  CONST2  CONST3  CONST4  CONST5 !/6X,5(1H-),00260300
     52(4X,7(1H-)),4X,5(8H! ------),2X,5(8H! ------),2H !)               00260400
137   FORMAT(I10,6X,4H MUN,8X,I3,6X,5(1H!,F7.2),2X,5(1H!,F7.2),2H !/     00260500
     1       I10,6X,4H IND,8X,I3,6X,5(1H!,F7.2),2X,5(1H1,F7.2),2H !/     00260600
     2       I10,6X,4HTRIB,8X,I3,6X,5(1H!,F7.2),2X,5(1H1,F7.2),2H !/     00260700
     3       I10,6X,4H UA ,8X,I3,6X,5(1H!,F7.2),2X,5(1H1,F7.2),2H !)     00260800
139   FORMAT(37X,5(8H! ------),2X,5(8H! ------),2H !/12X,11H ZONE TOTAL,00260900
     1 I8,6X,5(1H!,F7.2),2X,5(1H!,F7.2),2H !)                            00261000
141   FORMAT(1H0,10X,12H GRAND TOTAL,I8,6X,5F8.2)                         00261100
510   FORMAT(' ',20X,'TIME VARING TRIBUTARY AND URBAN LOADS AVERAGED FRO00261200
     1M CYCLE ',I4,1X,'THROUGH CYCLE ',I4)                               00261300
7000  FORMAT(2X,2A4,1X,A4,6F5.0,7I5)                                      00261400
7017  FORMAT(I10,10X,6F10.0)                                              00261500
7071  FORMAT(1H1///50X,34H***** VARYING WASTE LOADINGS *****//)           00261600
7072  FORMAT(1H0,33X,4HNODE,I4,1X,'LOCATED IN ZONE',I2,1X,'RECEIVES TYPE00261700
     1',I2,1X,'LOADS FROM ',2A4,2H (,A4,1H)//54X,19H DISCHARGE PERIOD =,00261800
     2 I5,7H CYCLES//32X,' START    DURATION    FLOW    CONST1   CONST2 00261900
     3  CONST3   CONST4   CONST5'/32X,' CYCLE    (CYCLES)   (CFS)    (MG00262000
     4/L)   (MG/L)   (MG/L)   (MG/L)   (MG/L)'/32X,' -----    --------',00262100
     56('   ------'))                                                    00262200
7078  FORMAT(1H ,31X,I5,6X,I5,2X,6(1X,F8.2))                              00262300
```

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 8603  FORMAT(1H1)                                                              00262400
       END                                                                      00262500
       SUBROUTINE WWADJ(INOPT,NUMCON,NJ,WLOAD,KK,JJ)                            00262600
       DIMENSION FACTR(5,20),NJSTRT(5,20),NJSTOP(5,20),RMSTRT(5,20),            00262700
      1    RMSTOP(5,20),REDF(5,160)                                            00262800
       COMMON/GROUP/MGROUP(6),LGROUP(4),NGROUP(5)                               00262900
       COMMON/WNF/RMNODE(160),FGSWO(99,5),FGSWA(99),IWFSCY,ICYC,ICCF(5),        00263000
      1 KSLACK,IWF,IWFFCY,INODOR(99),NMODE,NODERM(100,3)                        00263100
       DIMENSION WTYPE(12)                                                      00263200
       DATA WTYPE/4HMUNI,4HCIPA,4HLITY,4H  IN,4HDUST,4HRY  ,4H TRI,             00263300
      1 4HBUTA,4HRY  ,4HSTOR,4HM WA,4HTER /                                     00263400
       GO TO (100,200,300),INOPT                                                00263500
C*******  INITIALIZE ARRAYS  *******                                           00263600
 100   CONTINUE                                                                 00263700
       DO 140 I=1,NUMCON                                                        00263800
       DO 120 J=1,NJ                                                            00263900
       REDF(I,J) = 1.0                                                          00264000
 120   CONTINUE                                                                 00264100
 140   CONTINUE                                                                 00264200
       RETURN                                                                   00264300
 200   CONTINUE                                                                 00264400
C*******  READ FACTORS TO ADJUST INPUT LOADINGS BY ZONE AND TYPE  ******00264500
       DO 222 I=1,NUMCON                                                        00264600
       IF(MGROUP(I).EQ.0) GO TO 222                                             00264700
       MG = MGROUP(I)                                                           00264800
       KDELP1=1                                                                 00264900
       IF(MG.GT.100) GO TO 218                                                  00265000
       READ(5,220) (FACTR(I,K),NJSTRT(I,K),NJSTOP(I,K),K=1,MG)                  00265100
       GO TO 222                                                                00265200
 218   CONTINUE                                                                 00265300
       MG = MG - 100                                                            00265400
       READ(5,221) (FACTR(I,K),RMSTRT(I,K),RMSTOP(I,K),K=1,MG)                  00265500
       MG=MG+100                                                                00265600
 222   CONTINUE                                                                 00265700
C*******  PREPARE ADJUSTMENT FACTORS  *******                                  00265800
       DO 238 I=1,NUMCON                                                        00265900
       IF(MGROUP(I).EQ.0) GO TO 238                                             00266000
       MG = MGROUP(I)                                                           00266100
       IF(MG.GT.100) GO TO 233                                                  00266200
       DO 232 K=1,MG                                                            00266300
       NJ1 = NJSTRT(I,K)                                                        00266400
       NJ2 = NJSTOP(I,K)                                                        00266500
       DO 231 J=NJ1,NJ2                                                         00266600
       REDF(I,J) = FACTR(I,K)                                                   00266700
 231   CONTINUE                                                                 00266800
 232   CONTINUE                                                                 00266900
       GO TO 238                                                                00267000
 233   CONTINUE                                                                 00267100
       MG=MG-100                                                                00267200
       DO 236 K=1,MG                                                            00267300
       M1 = RMSTRT(I,K) + 0.5                                                   00267400
       M2 = RMSTOP(I,K) - 0.5                                                   00267500
       DO 235 M=M1,M2                                                           00267600
       DO 234 N=1,3                                                             00267700
       L = NODERM(M,N)                                                          00267800
       IF(L.EQ.0) GO TO 234                                                     00267900
       REDF(I,L) = FACTR(I,K)                                                   00268000
 234   CONTINUE                                                                 00268100
 235   CONTINUE                                                                 00268200
 236   CONTINUE                                                                 00268300
 238   CONTINUE                                                                 00268400
```

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C*******  PRINT TABLE OF ADJUSTMENT FACTORS  *******                    00268500
      IF(KDELP1.EQ.0) RETURN                                           00268600
      WRITE(6,240)                                                     00268700
      DO 243 K=1,4                                                     00268800
      IF(LGROUP(K).EQ.0) GO TO 243                                     00268900
      K2 = K*3                                                         00269000
      K1 = K2-2                                                        00269100
      WRITE(6,241)(WTYPE(I),I=K1,K2)                                   00269200
243   CONTINUE                                                         00269300
      WRITE(6,242)                                                     00269400
      DO 244 J=1,NJ                                                    00269500
      WRITE(6,245) J,(PEDF(I,J),I=1,NUMCON)                            00269600
244   CONTINUE                                                         00269700
      WRITE(6,8603)                                                    00269800
      RETURN                                                           00269900
C*******  ADJUST INPUT LOADINGS BY ZONE AND TYPE  *******              00270000
300   CONTINUE                                                         00270100
      WLOAD = WLOAD * PEDF(KK,JJ)                                      00270200
      RETURN                                                           00270300
220   FORMAT(5(F5.0,2I5))                                              00270400
221   FORMAT(5(3F5.0))                                                 00270500
240   FORMAT(1HO///52X,'TABLE OF ADJUSTMENT FACTORS'/44X, 'APPLIED TO TH00270600
     1E FOLLOWING WASTE SOURCE TYPES'//)                               00270700
241   FORMAT(1H ,59X,3A4)                                              00270800
242   FORMAT(1HO//43X,'NODE   CONST1  CONST2  CONST3  CONST4  CONST5'/  00270900
     1     43X,'-----  ',5(2X,6(1H-))/)                                00271000
245   FORMAT(1H ,42X,I3,3X,5F8.2)                                      00271100
8603  FORMAT(1H1)                                                      00271200
      END                                                              00271300
C                                                                      00271400
C*********************************************************************00271500
C                                                                      00271600
C                          DECAY SUBROUTINES                           00271700
C                                                                      00271800
C*********************************************************************00271900
C                                                                      00272000
      SUBROUTINE DECAY (J,K,CMASS)                                     00272001
      COMMON/TRN/C(160,5),Y(160),TRNSC(5),LOGOP(5),DMULT(5),IADOP(5)   00272002
     *          IADDTR(2),IDATRF,IADTRF,MLTTRF,LOGTRF                  00272003
      COMMON/FUNX/NCONS(5),CO(5,5),FUNC(12,5),CLIMIT(5),NCHLO,NAMM,NPHO, 00272004
     1          NAD1,NAD2,NDO,NNO3                                     00272005
      COMMON/RATES/RATE(160,15)THETA(15),RM(10),RXN(10),DTD,TEMP       00272006
      COMMON/PAR/CSAT,CDO,REOXK,SODD,PHOTUM,RESPM,CKT,CXT,AMUP,PHOP,DNK 00272007
      COMMON/AGEUM/AVOL(160),ASUR(160),VOL(160),VMEANJ(160)            00272008
C*******  MASS TRANSFERS                                               00272009
      TMASS=0.0                                                        00272010
      DO 100 I=1,5                                                     00272011
      TMASS=TMASS+CU(I,K)*RATE(J,I)*C(J,I)                             00272012
100   CONTINUE                                                         00272013
      TMASS=TMASS*VOL(J)                                               00272014
C*******  SPECIAL DO FUNCTIONS                                         00272015
      DOMASS=0.0                                                       00272016
      IF(K.NE.NDO)  GO TO 200                                          00272017
      DOMASS=DOMASS+FUNC(1,K)*(CSAT-C(J,K))*REOXX*VOL(J)               00272018
     1+FUNC(2,K)*ASUR(J)*SODD*3.2817*DTD+FUNC(3,K)*PHOTUM              00272019
     2+FUNC(4,K)*RESPM+FUNC(5,K)*PHOTOM+FUNC(6,K)*RESPM                00272020
200   CONTINUE                                                         00272021
C*******  OTHER SPECIAL FUNCTIONS                                      00272022
      SMASS7=FUNC(7,K)*CKT-CXT)                                        00272023
      SMASS8=FUNC(8,K)*AMUP*C(J,NAMM)                                  00272024
      SMASS9=FUNC(9,K)*PHOP*C(J,NPHO)                                  00272025
      SMAS10=FUNC(10,K)*RATE(J,6)*C(J,NAD1)                            00272026
      SMAS11=FUNC(11,K)*RATE(J,7)*C(J,NAD2)                            00272027
      SMAS12=FUNC(12,K)*DNK*C(J,NNO3)                                  00272028
      SMASS+(SMASS7+SMASS8+SMASS9+SMAS10+SMAS11+SMAS12)  *  VOL(J)     00272029
C*******  COMPUTE NEW MASS  *******                                    00272030
      CMASS=CMASS+TMASS+DOMASS+SMASS                                   00272031
      RETURN                                                           00272032
      END                                                              00272033
```

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      SUBROUTINE NORGDK (INOPT,K,NJ)                                    00272100
      COMMON/RATES/RATE(160,15),THETA(15),RM(10),RXN(10),DTD,TEMP       00272200
      IF(INOPT.EQ.2) GO TO 200                                          00272300
C*******  SET AMMONIFICATION RATES  *******                             00272400
      DO 150 J=1,NJ                                                     00272500
      RATE(J,K) = 0.07                                                  00272600
150   CONTINUE                                                          00272700
      THETA(1)=1.047                                                    00272800
      RETURN                                                            00272900
200   CONTINUE                                                          00273000
C*******  SET SETTLING RATES  *******                                   00273100
      RM(1) = 1.0                                                       00273200
      RM(2) = 24.0                                                      00273300
      RM(3) = 46.0                                                      00273400
      RM(4) = 85.0                                                      00273500
      RM(5) = 101.0                                                     00273600
      RXN(1) = 0.07                                                     00273700
      RXN(2) = 0.15                                                     00273800
      RXN(3) = 0.12                                                     00273900
      RXN(4) = 0.12                                                     00274000
      CALL RXMILE(7,4,0)                                                00274100
      THETA(7)=1.00                                                     00274200
      RETURN                                                            00274300
      END                                                               00274400
      SUBROUTINE NITRIF(K,NITROP,NJ,NMODE)                              00274500
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      COMMON/RATES/RATE(160,15),THETA(15),RM(10),RNIT(10),DTD,TEMP      00274600
C*************************************************************************00274700
C         NITROP            NITRIFICATION OPTION                        *00274800
C         ------    ----------------------------------------            *00274900
C           0       READ IN NITRIFICATION RATES AND PATTERN             *00275000
C           1       STANDARD NITRIFICATION RATES AND PATTERN            *00275100
C           2       STANDARD NITRIFICATION PATTERN ; READ IN RATES      *00275200
C           3       HIGH NITRIFICATION RATES IN STANDARD PATTERN        *00275300
C           4       NITRIFICATION LINKED TO NITROSOMONAS BACTERIA       *00275400
C*************************************************************************00275500
      IF(NITROP.EQ.0) RETURN                                             00275600
      THETA(2)=1.085                                                     00275700
      IF(TEMP.GE.15.0) GO TO 50                                          00275800
C*******  NITRIFICATION SUPPRESSED BELOW 15 C  *******                   00275900
      DO 25 J=1,NJ                                                       00276000
      RATE(J,2) = 0.0                                                    00276100
25    CONTINUE                                                           00276200
      RETURN                                                             00276300
50    CONTINUE                                                           00276400
C*******  SET STANDARD RATES  *******                                    00276500
      RNIT(1) = 0.04                                                     00276600
      RNIT(2) = 0.06                                                     00276700
      RNIT(3) = 0.20                                                     00276800
      RNIT(4) = 0.02                                                     00276900
      RNIT(5) = 0.06                                                     00277000
      RNIT(6) = 0.20                                                     00277100
      RNIT(7) = 0.20                                                     00277200
      GO TO (120,110,100,200),NITROP                                     00277300
C*******  SET HIGH NITRIFICATION RATES  *******                          00277400
100   CONTINUE                                                           00277500
      RNIT(3) = 0.30                                                     00277600
      RNIT(4) = 0.06                                                     00277700
      RNIT(5) = 0.15                                                     00277800
      RNIT(6) = 0.50                                                     00277900
      RNIT(7) = 0.30                                                     00278000
      GO TO 120                                                          00278100
110   CONTINUE                                                           00278200
      READ(5,115) (RNIT(I),I=1,7)                                        00278300
115   FORMAT(45X,7F5.0)                                                  00278400
120   CONTINUE                                                           00278500
C*******  SET NITRIFICATION PATTERN AS FUNCTION OF TEMP  *******         00278600
      XLEN = 17.0 * 1.085**(20.0-TEMP)                                   00278700
      RM(1) = 0.5                                                        00278800
      RM(2) = 5.0                                                        00278900
      RM(3) = 14.0                                                       00279000
      RM(4) = 26.5                                                       00279100
      RM(5) = 26.5 + XLEN                                                00279200
      RM(6) = 26.5 + 2*XLEN                                              00279300
      RM(7) = 26.5 + 3*XLEN                                              00279400
      IF(RM(7).GT.85.0) RM(7)=85.0                                       00279500
      RM(8) = 86.0                                                       00279600
C*******  SET NITRIFICATION FOR ESTUARY  *******                         00279700
      CALL RXMILE(K,7,0)                                                 00279800
C*******  SET NITRIFICATION FOR TRIBUTARIES  *******                     00279900
      RM(1) = 86.0                                                       00280000
      RM(2) = 101.0                                                      00280100
      CALL RXMILE(K,1,0)                                                 00280200
      RETURN                                                             00280300
200   CONTINUE                                                           00280400
C*******  NITRIFICATION LINKED TO NITROSOMONAS BACTERIA  *******         00280500
      WRITE(6,250)                                                       00280600
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250   FORMAT(1HO//10X,'NITRIFICATION LINKED TO NITROSOMONAS BACTERIA IS 00280700
     1NOT YET PROGRAMMED ; STANDARD NITRIFICATION WILL BE ASSUMED ')    00280800
      NITROP = 1                                                        00280900
      GO TO 120                                                         00281000
      END                                                               00281100
      SUBROUTINE NO3DK(K,NJ)                                            00281200
      COMMON/RATES/RATE(160,15),THETA(15),RM(10),RXN(10),DTD,TEMP       00281300
      COMMON/DENITR/DNMAX,DNBRK,DNDOBR,DNSTRT,THETDN                    00281400
C*******  SET BIOLOGICAL UPTAKE RATES  *******                          00281500
      DO 100 J=1,NJ                                                     00281600
      RATE(J,K) = 0.02                                                  00281700
100   CONTINUE                                                          00281800
      THETA(3)=1.16                                                     00281900
C*******  SET DENITRIFICATION RATES  *******                            00282000
      DNMAX = 0.28                                                      00282100
      DNBRK = 0.11                                                      00282200
      DNDOBR = 0.20                                                     00282300
      DNSTRT = 1.00                                                     00282400
      THETDN = 1.12                                                     00282500
      WRITE(6,1805) DNSTRT,DNSTRT,DNDOBR,DNBRK,DNDOBR,DNMAX,THETDN      00282600
1805  FORMAT(1H /71H THE DENITRIFICATION RATE (DNK) IS DETERMINED BY TEM00282700
     1P AND DO AS FOLLOWS/23H    FOR DO LEVELS ABOVE,F7.2,14H MG/L, DNK 00282800
     2= 0/25H    FOR DO LEVELS BETWEEN,F7.2,4H AND,F7.2,36H DNK INCREASE00282900
     3S LINEARLY FROM ZERO TO ,F7.3,5H /DAY/23H    FOR DO LEVELS BELOW,F00283000
     47.2,32H MG/L, DNK INCREASES LINEARLY TO,F7.2,5H /DAY/43H THETA USF00283100
     5D FOR TEMPERATURE CORRECTION IS  ,F5.3//)                         00283200
      RETURN                                                            00283300
      END                                                               00283400
      SUBROUTINE DENIT(INOPT)                                           00283500
      COMMON/PAR/CSAT,CDO,REOXK,SODD,PHOTOM,RESPM,CKT,CXT,AMUP,PHUP,DNK 00283600
      COMMON/RATES/RATE(160,15),THETA(15),RM(10),RXN(10),DTD,TEMP       00283700
      COMMON/DENITR/DNMAX,DNBRK,DNDOBR,DNSTRT,THETDN                    00283800
      IF(INOPT.EQ.2) GO TO 200                                          00283900
C*******  CALCULATE REACTION PARAMETERS AS FUNCTION OF TEMP AND DO  ****00284000
      TFACTR = THETDN**(TEMP-20.0)                                      00284100
      DNMX = DNMAX * TFACTR                                             00284200
      DNBR = DNBRK * TFACTR                                             00284300
      DNSL1 = DNBR / (DNDOBR-DNSTRT)                                    00284400
      DNSL2 = (DNMX-DNBR) / (-DNDOBR)                                   00284500
      RETURN                                                            00284600
200   CONTINUE                                                          00284700
C*******  CALCULATE INSTANTANEOUS REACTION RATE FROM AMBIENT DO  *******00284800
      IF(CDO.GT.DNSTRT) GO TO 300                                       00284900
      DNK = DNBR + DNSL1*(CDO-DNDOBR)                                   00285000
      IF(CDO.GT.DNDOBR) GO TO 350                                       00285100
      DNK = DNMX + DNSL2*CDO                                            00285200
      GO TO 350                                                         00285300
300   CONTINUE                                                          00285400
      DNK = 0.0                                                         00285500
      RETURN                                                            00285600
350   CONTINUE                                                          00285700
      DNK = 1.0 - EXP(-DNK*DTD)                                         00285800
      RETURN                                                            00285900
      END                                                               00286000
      SUBROUTINE CBODDK(INOPT,K,NJ)                                     00286100
      COMMON/RATES/RATE(160,15),THETA(15),RM(10),RXN(10),DTD,TEMP       00286200
      IF(INOPT.EQ.2) GO TO 200                                          00286300
C*******  SET DEOXYGENATION RATES  *******                              00286400
      RM(1) = 1.0                                                       00286500
      RM(2) = 24.0                                                      00286600
      RM(3) = 101.0                                                     00286700
```

```
      RXN(1) = 0.18
      RXN(2) = 0.23
      CALL RXMILE(4,2,0)
      THETA(4)=1.047
      RETURN
200   CONTINUE
C*******  SET SETTLING RATES  *******
      RM(1) = 1.0
      RM(2) = 3.0
      RM(3) = 24.0
      RM(4) = 45.0
      RM(5) = 85.0
      RM(6) = 101.0
      RXN(1) = 0.07
      RXN(2) = 0.02
      RXN(3) = 0.07
      RXN(4) = 0.02
      RXN(5) = 0.05
      CALL RXMILE(6,5,0)
      THETA(6) = 1.00
      RETURN
      END
      SUBROUTINE DOBUDG(INOPT,K,J,NMODE)
      COMMON NSPEC,DELTO,NUMCON,NALPHA,NJ,KZOP,
     1  NTIMES,CTIME1,CTIME,TSRISE,TSSET
      COMMON/RATES/RATE(160,7),WINDSP(160),WINDOX(160),SOD(160),
     1  CHLORO(160),PHOTO(160),RESP(160),DEPTHP(160),ADEPTH(160),
     2  THETA(15),RM(10),RXN(10),DTD,TEMP
      COMMON/FUNX/NCONS(5),CO(5,5),FUNC(12,5),CLIMIT(5),NCHLO,NAMM,NPHO,
     1            NAD1,NAD2,NDO,NNO3
      COMMON/TRN/C(160,5),Y(160),TRNSC(5),LOGOP(5),DMULT(5),IADOP(5),
     1           IADDTR(2),IDATRF,IADTRF,MLTTRF,LOGTRF
      COMMON/CHAN/V(260),Q(260),NCHAN(160,5)
      COMMON/PAR/CSAT,CDO,REOXK,SODD,PHOTOM,RESPM,CKT,CXT,AMUP,PHUP,DNK
      COMMON/AGEOM/AVOL(160),ASUR(160),VOL(160),VMEANJ(160)
C*********************************************************************
C        INOPT            DO BUDGET SECTION                          *
C        -----     ----------------------------------------          *
C          1       SET DEFAULT PARAMETERS                            *
C          2       READ IN VALUES TO OVERRIDE DEFAULT PARAMETERS     *
C          3       CORRECT PARAMETERS FOR TEMPERATURE                *
C          4       CORRECT PARAMETERS TO INTERNAL UNITS              *
C          5       READ IN PARAMETERS FOR NEW TEMPERATURE            *
C          6       CALCULATE EFFECTS ON AMBIENT DO LEVELS            *
C*********************************************************************
      GO TO (100,200,300,400,210,600), INOPT
100   CONTINUE
C
C*******  SET DEFAULT RATES AND PARAMETERS  *******
C
      THETA(NDO) = 1.025
C*******  WIND FACTORS  *******
      WINDF = 0.75
      WINDB = 10.0
      DO 110 J=1,NJ
      WINDSP(J) = 0.0
      WINDOX(J)=1.0
110   CONTINUE
C*******  SEDIMENT OXYGEN DEMAND  *******
      RM(1) = 1.0
      RM(2) = 4.0
```

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      RM(3) = 12.0                                                      00292900
      RM(4) = 23.0                                                      00293000
      RM(5) = 27.0                                                      00293100
      RM(6) = 38.0                                                      00293200
      RM(7) = 50.0                                                      00293300
      RM(8) = 60.0                                                      00293400
      RM(9) = 85.0                                                      00293500
      RM(10) = 101.0                                                    00293600
      RXN(1) = 2.5                                                      00293700
      RXN(2) = 1.0                                                      00293800
      RXN(3) = 0.5                                                      00293900
      RXN(4) = 1.0                                                      00294000
      RXN(5) = 2.7                                                      00294100
      RXN(6) = 1.6                                                      00294200
      RXN(7) = 1.0                                                      00294300
      RXN(8) = 0.6                                                      00294400
      RXN(9) = 1.0                                                      00294500
      CALL RXMILE(10,9,0)                                               00294600
      IF(NMODE.EQ.1) GO TO 115                                          00294700
      RM(1) = 27.0                                                      00294800
      RM(2) = 38.0                                                      00294900
      RM(3) = 50.0                                                      00295000
      RXN(1) = 4.0                                                      00295100
      RXN(2) = 2.7                                                      00295200
      CALL RXMILE(10,2,1)                                               00295300
      RXN(1) = 1.0                                                      00295400
      RXN(2) = 1.0                                                      00295500
      CALL RXMILE(10,2,3)                                               00295600
115   CONTINUE                                                          00295700
      THETA(10) = 1.05                                                  00295800
      SODBR = 2.0                                                       00295900
      SODEXP = 0.45                                                     00296000
C*******  ALGAL PHOTOSYNTHESIS AND RESPIRATION RATES  *******           00296100
      RESS = 0.017                                                      00296200
      PHOTT = 0.079                                                     00296300
      IF(NMODE.EQ.2) RESS=0.012                                         00296400
      DO 120 J=1,NJ                                                     00296500
      PHOTO(J)=PHOTT                                                    00296600
      RESP(J)=RESS                                                      00296700
120   CONTINUE                                                          00296800
      THETA(12) = 1.085                                                 00296900
      THETA(13) = 1.085                                                 00297000
C*******  BACKGROUND ALGAL CONCENTRATIONS  *******                     00297100
      DO 130 J=1,NJ                                                     00297200
      CHLORO(J)=25.0                                                    00297300
130   CONTINUE                                                          00297400
C*******  AVERAGE EUPHOTIC DEPTHS  *******                             00297500
      RM(1) = 1.0                                                       00297600
      RM(2) = 5.0                                                       00297700
      RM(3) = 20.0                                                      00297800
      RM(4) = 50.0                                                      00297900
      RM(5) = 60.0                                                      00298000
      RM(6) = 85.0                                                      00298100
      RM(7) = 101.0                                                     00298200
      RXN(1) = 12.0                                                     00298300
      RXN(2) = 8.0                                                      00298400
      RXN(3) = 9.0                                                      00298500
      RXN(4) = 6.0                                                      00298600
      RXN(5) = 3.0                                                      00298700
      RXN(6) = 6.0                                                      00298800
      CALL RXMILE(14,6,0)                                               00298900
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200   CONTINUE                                                          00299000
      T1 = 20.0                                                         00299100
210   CONTINUE                                                          00299200
C                                                                       00299300
C*******  READ IN VALUES TO OVERRIDE DEFAULT VALUES  *******            00299400
C                                                                       00299500
C*******  REAERATION PARAMETERS  *******                               00299600
      READ(5,99892) ND,IREOXK                                           00299700
      IK = IREOXK + 1                                                   00299800
      GO TO (222,224,226,228),IK                                        00299900
C*******  0.  O'CONNOR-DOBBINS FORMULA  *******                        00300000
222   CONTINUE                                                          00300100
      A=13.0                                                            00300200
      W=0.5                                                             00300300
      X=-1.5                                                            00300400
      WRITE(6,23)K,TEMP                                                 00300500
      GO TO 244                                                         00300600
C*******  1.  CHURCHILL FORMULA  *******                               00300700
224   CONTINUE                                                          00300800
      A=11.6                                                            00300900
      X=-5.0/3.0                                                        00301000
      W=0.97                                                            00301100
      WRITE(6,25) K,TEMP                                                00301200
      GO TO 244                                                         00301300
C*******  2.  USGS FORMULA  *******                                    00301400
226   CONTINUE                                                          00301500
      A=7.57                                                            00301600
      W=1.0                                                             00301700
      X=-4.0/3.0                                                        00301800
      WRITE(6,27) K,TEMP                                                00301900
      GO TO 244                                                         00302000
C*******  3.  CONSTANT REAERATION RATE  *******                        00302100
228   CONTINUE                                                          00302200
      WRITE(6,29)K,TEMP                                                 00302300
      IF(ND.EQ.0) GO TO 222                                             00302400
      CALL RATEIN(NDO,NJ,ND)                                            00302500
      W=0.0                                                             00302600
      X=0.0                                                             00302700
      GO TO 246                                                         00302800
244   CONTINUE                                                          00302900
      DO 245 J=1,NJ                                                     00303000
      RATE(J,NDO) = A                                                   00303100
245   CONTINUE                                                          00303200
246   CONTINUE                                                          00303300
      CSAT = 14.652 - 0.41022*TEMP + 0.0079910*TEMP*TEMP - 0.000077779* 00303400
     *  TEMP*TEMP*TEMP                                                  00303500
      WRITE(6,32) K,TEMP,CSAT                                           00303600
C*******  READ WIND FACTORS  *******                                   00303700
      READ(5,99892) ND                                                  00303800
      IF(ND.EQ.0) GO TO 250                                             00303900
C*******  READ AVERAGE DAILY WIND SPEED  *******                       00304000
      CALL RATEIN(8,NJ,ND)                                              00304100
C*******  READ WIND MULT.FACTORS, F(WIND DIR,RIVER WIDTH,ETC)  *******  00304200
      READ(5,99892)ND                                                   00304300
      IF(ND.EQ.0) GO TO 250                                             00304400
      CALL RATEIN(9,NJ,ND)                                              00304500
      READ(5,801) WINDF,WINDB                                           00304600
      WRITE(6,20010) WINDF,WINDB                                        00304700
250   CONTINUE                                                          00304800
C*******  CALCULATE AVERAGE REAERATION AND EXTRA WIND CONTRIBUTION  ****00304900
      DO 255 J=1,NJ                                                     00305000
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      ADEPTH(J) = AVOL(J)/ASUR(J)                                       00305100
      RATE(J,NDO)=RATE(J,NDO)*VMEANJ(J)**W*ADEPTH(J)**X                 00305200
      WINDEX = WINDSP(J) - WINDB                                        00305300
      IF(WINDEX.LT.0.0) WINDEX=0.0                                      00305400
      WINDOX(J) = WINDOX(J)*WINDEX*WINDF/ADEPTH(J)                      00305500
  255 CONTINUE                                                          00305600
C******* READ SEDIMENT OXYGEN DEMAND RATES *******                     00305700
      READ(5,99892) ND                                                  00305800
      IF(ND.EQ.0) GO TO 260                                             00305900
      CALL RATEIN(10,NJ,ND)                                             00306000
      READ(5,801) THETA(10),SODBR,SODEXP                                00306100
  260 CONTINUE                                                          00306200
      WRITE(6,805) SODBR,SODBR,SODBR,SODEXP,THETA(10)                   00306300
C******* READ ALGAL PHOTOSYNTHESIS AND RESPIRATION RATES *******        00306400
      IF(INOPT.NE.5) GO TO 265                                          00306500
C******* CONVERT P & R RATES TO OUTPUT UNITS *******                    00306600
      DO 262 J=1,NJ                                                     00306700
      IF(CHLORO(J).EQ.0) CHLORO(J)=0.00001                              00306800
      PHOTO(J) = PHOTO(J)/CHLORO(J)                                     00306900
      RESP(J) = RESP(J)/CHLORO(J)                                       00307000
  262 CONTINUE                                                          00307100
  265 CONTINUE                                                          00307200
      READ(5,55001) ND,THET                                             00307300
      IF(ND.EQ.0) GO TO 270                                             00307400
      THETA(12) = THET                                                  00307500
      THETA(13) = THET                                                  00307600
      CALL RATEIN(12,NJ,ND)                                             00307700
      CALL RATEIN(13,NJ,ND)                                             00307800
  270 CONTINUE                                                          00307900
C******* READ ALGAL CONCENTRATIONS *******                              00308000
      READ(5,99892) ND                                                  00308100
      IF(ND.EQ.0) GO TO 280                                             00308200
      CALL RATEIN(11,NJ,ND)                                             00308300
  280 CONTINUE                                                          00308400
C******* READ IN EUPHOTIC DEPTHS *******                               00308500
      READ(5,99892) ND,NDP                                              00308600
      IF(NDP.EQ .0) GO TO 285                                           00308700
      RM(1) = 1.0                                                       00308800
      RM(2) = 5.0                                                       00308900
      RM(3) = 20.0                                                      00309000
      RM(4) = 50.0                                                      00309100
      RM(5) = 60.0                                                      00309200
      RM(6) = 85.0                                                      00309300
      RM(7) = 101.0                                                     00309400
      RXN(1) = 9.0                                                      00309500
      RXN(2) = 5.0                                                      00309600
      RXN(3) = 6.0                                                      00309700
      RXN(4) = 4.0                                                      00309800
      RXN(5) = 2.0                                                      00309900
      RXN(6) = 4.0                                                      00310000
      CALL RXMILE(14,6,0)                                               00310100
  285 CONTINUE                                                          00310200
      IF(ND.EQ.0) GO TO 290                                             00310300
      CALL RATEIN(14,NJ,ND)                                             00310400
  290 CONTINUE                                                          00310500
      RETURN                                                            00310600
  300 CONTINUE                                                          00310700
C                                                                       00310800
C******* CORRECT DO BUDGET RATES FOR TEMPERATURE *******                00310900
C                                                                       00311000
C******* REAERATION *******                                            00311100
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      IF(FUNC(1,NDO).NE.0) A=A*THETA(NDO)**(TEMP-T1)                    00311200
C*******  SEDIMENT OXYGEN DEMAND  *******                               00311300
      IF(FUNC(2,NDO).NE.0) CALL TEMPCR(10,NJ,TEMP,T1,THETA(10))         00311400
C*******  ALGAL RATES  *******                                          00311500
      IF(FUNC(3,NDO).EQ.0.AND.FUNC(5,NDO).EQ.0) GO TO 310               00311600
      CALL TEMPCR(12,NJ,TEMP,T1,THETA(12))                              00311700
      CALL TEMPCR(13,NJ,TEMP,T1,THETA(13))                              00311800
310   CONTINUE                                                          00311900
      T1 = TEMP                                                         00312000
      RETURN                                                            00312100
400   CONTINUE                                                          00312200
C                                                                       00312300
C*******  CORRECT DO BUDGET RATES TO INTERNAL UNITS  *******            00312400
C                                                                       00312500
C*******  LINK AVERAGE WIND TO CONSTANT REAERATION RATE  *******        00312600
      IF(IREOXK.NE.3) GO TO 415                                         00312700
      DO 413 J=1,NJ                                                     00312800
      RATE(J,NDO)=RATE(J,NDO)+WINDOX(J)                                 00312900
413   CONTINUE                                                          00313000
415   CONTINUE                                                          00313100
C*******  PHOTOSYNTHESIS AND RESPIRATION RATES  *******                 00313200
      IF(FUNC(5,NDO).EQ.0) GO TO 430                                    00313300
      DO 420 J=1,NJ                                                     00313400
      PHOTO(J) = PHOTO(J) * CHLORO(J)                                   00313500
      RESP(J) = RESP(J) * CHLORO(J)                                     00313600
420   CONTINUE                                                          00313700
430   CONTINUE                                                          00313800
      RETURN                                                            00313900
600   CONTINUE                                                          00314000
C*******  COMPUTE LOCAL INSTANTANEOUS REAERATION RATE  *******          00314100
      IF(IREOXK.LT.3) GO TO 610                                         00314200
C*******  REAERATION CONSTANT OVER TIME  *******                        00314300
      REOXK = RATE(J,NDO)                                               00314400
      GO TO 617                                                         00314500
C*******  REAERATION VARYING WITH VELOCITY AND DEPTH  *******           00314600
610   CONTINUE                                                          00314700
      QK = 0.0                                                          00314800
      QQ = 0.0                                                          00314900
      DO 615 M=1,5                                                      00315000
      IF(NCHAN(J,M).EQ.0) GO TO 615                                     00315100
      NCH = NCHAN(J,M)                                                  00315200
      QK = V(NCH) * Q(NCH) + QK                                         00315300
      QQ = QQ + ABS(Q(NCH))                                             00315400
615   CONTINUE                                                          00315500
      VEL = QK/QQ                                                       00315600
      DEPTH = VOL(J)/ASUR(J)                                            00315700
      REOXK = A * VEL**W * DEPTH**X                                     00315800
C*******  COMPUTE WIND EFFECT ON REAERATION  *******                    00315900
      REOXK = REOXK + WINDOX(J)                                         00316000
C*******  INTERNAL UNITS  *******                                       00316100
      REOXK = 1.0 - EXP(-REOXK * DTD)                                   00316200
617   CONTINUE                                                          00316300
C*******  COMPUTE EFFECTIVE SOD FROM AMBIENT DO  *******                00316400
      IF(FUNC(2,K).EQ.0) GO TO 625                                      00316500
      IF(CDO.GT.SODBR) GO TO 620                                        00316600
      SODD = SOD(J) * (CDO/SODBR)**SODEXP                               00316700
      GO TO 625                                                         00316800
620   CONTINUE                                                          00316900
      SODD = SOD(J)                                                     00317000
625   CONTINUE                                                          00317100
C*******  COMPUTE ALGAL PHOTOSYNTHESIS AND RESPIRATION  *******         00317200
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      IF (FUNC(3,K).EQ.0.AND.FUNC(4,K).EQ.0) GO TO 640                  00317300
      RESPM = VOL(J) * RESP(J) * DELTQ1 * C(J,NCHLO)                    00317400
      IF(CTIME.GT.TSRISE.AND.CTIME.LE.TSSET) GO TO 630                  00317500
      PHOTOM = 0.                                                       00317600
      GO TO 660                                                         00317700
  630 XVOL = ASUR(J) * DEPTH                                            00317800
      IF(XVOL.GT.VOL(J)) GO TO 635                                      00317900
      PHOTOM = XVOL * PHOTO(J) * C(J,NCHLO) * DELTQ1                    00318000
      GO TO 660                                                         00318100
  635 PHOTOM = VOL(J) * PHOTO(J) * C(J,NCHLO) * DELTQ1                  00318200
      GO TO 660                                                         00318300
  640 CONTINUE                                                          00318400
      IF(FUNC(5,K).EQ.0.AND.FUNC(6,K).EQ.0) GO TO 660                   00318500
      RESPM = RESP(J) * VOL(J) * DTD                                    00318600
      IF (CTIME.GT.TSRISE.AND.CTIME.LE.TSSET) GO TO 645                 00318700
      PHOTOM = 0.0                                                      00318800
      GO TO 660                                                         00318900
  645 XVOL = ASUR(J) * DEPTHP(J)                                        00319000
      IF (XVOL.GT.VOL(J)) GO TO 650                                     00319100
      PHOTOM = PHOTO(J) * XVOL * DTD                                    00319200
      GO TO 660                                                         00319300
  650 PHOTOM = PHOTO(J) * VOL(J) * DTD                                  00319400
      GO TO 660                                                         00319500
  660 CONTINUE                                                          00319600
      RETURN                                                            00319700
99892 FORMAT(45X,7I5)                                                   00319800
55001 FORMAT(45X,I5,6F5.0)                                              00319900
  801 FORMAT(45X,7F5.0)                                                 00320000
   23 FORMAT(1H //39H REOXYGENATION CONSTANT FOR CONSTITUENT,I2,69H COMP00320100
     *UTED BY O"CONNOR-DOBBINS RELATIONSHIP  K2 = 12.9*V**0.5 / H**1.5,/00320200
     *33H K1 AND K2 HAVE BEEN CORRECTED TO,F6.2,19H DEGREES CENTIGRADE/)00320300
   25 FORMAT(1H //39H REOXYGENATION CONSTANT FOR CONSTITUENT,I2,69H COMP00320400
     *UTED BY CHURCHILL RELATIONSHIP  K2 = 11.6*V**0.97 / H**(5/3)    ,/00320500
     *33H K1 AND K2 HAVE BEEN CORRECTED TO,F6.2,19H DEGREES CENTIGRADE/)00320600
   27 FORMAT(1H //39H REOXYGENATION CONSTANT FOR CONSTITUENT,I2,69H COMP00320700
     *UTED BY USGS RELATIONSHIP  K2 = 7.57*V**1.0 / H**(4/3)          ,/00320800
     *33H K1 AND K2 HAVE BEEN CORRECTED TO,F6.2,19H DEGREES CENTIGRADE/)00320900
   29 FORMAT(1H //40H REOXYGENATION CONSTANTS FOR CONSTITUENT,I2,47H ARE00321000
     1 CONSTANT FOR EACH LOCATION IN THE ESTUARY /                      00321100
     *33H K1 AND K2 HAVE BEEN CORRECTED TO,F6.2,19H DEGREES CENTIGRADE/)00321200
   32 FORMAT(1H //34H THE DO SATURATION FOR CONSTITUENT,I5,3H AT,F6.2,9H00321300
     * DEG.C IS,F6.3)                                                   00321400
  805 FORMAT(1H /59H THE SOD RATE (BENTH) IS MODIFIED BY TEMP AND DO AS 00321500
     1FOLLOWS/23H    FOR DO LEVELS ABOVE,F7.2,32H MG/L, THE SOD RATE IS 00321600
     2UNCHANGED/23H    FOR DO LEVELS BELOW,F7.2,17H SOD = BENTH*(DO/,F5.00321700
     32,4H )**,F5.2/45H THE THETA USED FOR TEMPERATURE CORRECTION IS,F6.00321800
     43///)                                                            00321900
20010 FORMAT(1H //69H THE REOXYGENATION RATE IS MODIFIED BY WIND SPEED S00322000
     1UCH THAT K2 = K2 +,F4.2,20H * WIND(MPH) /                        00322100
     2                          11H WIND ABOVE,F4.1,25H MPH IS USED TO MO00322200
     3DIFY K2)                                                         00322300
      END                                                               00322400
      SUBROUTINE NORDR(INOPT,K,NJ,CONC,CONC2)                           00322500
      COMMON/RATES/RATE(160,15),THETA(15),RM(10),RXN(10),DTD,TEMP       00322600
      COMMON/HORDER/XORDER(5),YORDER(5),RORDER(5)                       00322700
      GO TO (100,200,300),INOPT                                         00322800
  100 CONTINUE                                                          00322900
      READ(5,801) RORDER(K)                                             00323000
  801 FORMAT(45X,7F5.0)                                                 00323100
      WRITE(6,1161) K,RORDER(K)                                         00323200
 1161 FORMAT(1H //16H CONSTITUENT NO.,I5,18H IS DECAYED WITH A,F5.1,15H 00323300
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     *ORDER REACTION/)                                                                  00323400
      XORDER(K) = RORDER(K) - 1.0                                                       00323500
      YORDER(K) = 1.0 / XORDER(K)                                                       00323600
      RETURN                                                                            00323700
200   CONTINUE                                                                          00323800
      DO 250 J=1,NJ                                                                     00323900
      RATE(J,K) = RATE(J,K) * DTD                                                       00324000
250   CONTINUE                                                                          00324100
      RETURN                                                                            00324200
300   CONTINUE                                                                          00324300
      CONC2 =(1.0/(RATE(J,K)*XORDER(K)+(1.0/CONC**XORDER(K))))                          00324400
     1  **YORDER(K)                                                                    00324500
      RETURN                                                                            00324600
      END                                                                               00324700
      SUBROUTINE LINK                                                                   00324800
      COMMON/FUNX/NCONS(5),CO(5,5),FUNC(12,5),CLIMIT(5),NCHLO,NAMM,NPHO,00324900
     1            NAD1,NAD2,NDO,NNO3                                                    00325000
C*******  INITIALIZATION  *******                                                      00325100
      DO 22 K=1,5                                                                       00325200
      DO 21 I=1,5                                                                       00325300
      II=I+5                                                                            00325400
      CO(I,K) = 0.0                                                                     00325500
      FUNC(I,K) = 0.0                                                                   00325600
      FUNC(II,K) = 0.0                                                                  00325700
21    CONTINUE                                                                          00325800
      FUNC(11,K) =0.0                                                                   00325900
      FUNC(12,K) =0.0                                                                   00326000
      CLIMIT(K) = 500.                                                                  00326100
      NCONS(K) = 1                                                                      00326200
22    CONTINUE                                                                          00326300
C*******  SET STANDARD LINKS AND FUNCTIONS  *******                                    00326400
      NCHLO = 0                                                                         00326500
      NAMM  = 2                                                                         00326600
      NPHO  = 0                                                                         00326700
      NAD1  = 4                                                                         00326800
      NAD2  = 1                                                                         00326900
      NDO   = 5                                                                         00327000
      NNO3  = 3                                                                         00327100
      FUNC(1,5)= +1.0                                                                   00327200
      FUNC(2,5)= -1.0                                                                   00327300
      FUNC(5,5)= +1.0                                                                   00327400
      FUNC(6,5)= -1.0                                                                   00327500
      FUNC(10,4)=-1.0                                                                   00327600
      FUNC(11,3)=-1.0                                                                   00327700
      FUNC(12,3)=-1.0                                                                   00327800
      FUNC(12,5)=+2.86                                                                  00327900
      CO(1,1) = -1.0                                                                    00328000
      CO(3,1) = +1.0                                                                    00328100
      CO(1,2) = +1.0                                                                    00328200
      CO(2,2) = -1.0                                                                    00328300
      CO(2,3) = +1.0                                                                    00328400
      CO(3,3) = -1.0                                                                    00328500
      CO(4,4) = -1.0                                                                    00328600
      CO(4,5) = -1.0                                                                    00328700
      CO(2,5) = -4.57                                                                   00328800
      RETURN                                                                            00328900
      END                                                                               00329000
      SUBROUTINE RATEIN(K,NJ,ND)                                                        00329100
      COMMON/RATES/RATE(160,15),THETA(15),RM(10),RXN(10),DTD,TEMP                       00329200
      IF(ND.GT.100) GO TO 100                                                           00329300
C*******  READ IN DECAY RATES BY MODEL NODES  *******                                  00329400
```

```
      DO 50 I=1,ND                                                      00329500
      READ(5,721) NJF,NJL,DECAY                                         00329600
  721 FORMAT(2I10,F10.0)                                                00329700
      DO 40 J=NJF,NJL                                                   00329800
      RATE(J,K) = DECAY                                                 00329900
   40 CONTINUE                                                          00330000
   50 CONTINUE                                                          00330100
      RETURN                                                            00330200
  100 CONTINUE                                                          00330300
      ND = ND - 100                                                     00330400
C*******  READ IN DECAY RATES BY RIVER MILES  *******                  00330500
      DO 150 I=1,ND                                                     00330600
      II = I + 1                                                        00330700
      READ(5,757) RM(I),RM(II),RXN(I)                                   00330800
  757 FORMAT(3F10.0)                                                    00330900
  150 CONTINUE                                                          00331000
      CALL RXMILE(K,ND,0)                                               00331100
      RETURN                                                            00331200
      END                                                               00331300
      SUBROUTINE RXMILE(K,NZONES,NSIDE)                                 00331400
      COMMON/RATES/RATE(160,15),THETA(15),RM(10),RXN(10),DTD,TEMP       00331500
      COMMON/WNF/RMNODE(160),FGSWO(99,5),FGSWA(99),IWFSCY,ICYC,IGCF(5), 00331600
     1 KSLACK,IWF,IWFFCY,INODOR(99),NMODE,NODERM(100,3)                 00331700
      NSIDE1=NSIDE                                                      00331800
      NSIDE2=NSIDE                                                      00331900
      IF(NSIDE.NE.0) GO TO 25                                           00332000
      NSIDE1=1                                                          00332100
      NSIDE2=3                                                          00332200
   25 CONTINUE                                                          00332300
      DO 150 I=1,NZONES                                                 00332400
      II= I + 1                                                         00332500
      M1 = RM(I) + 0.5                                                  00332600
      M2 = RM(II) - 0.5                                                 00332700
      DO 100 M=M1,M2                                                    00332800
      DO 50 N=NSIDE1,NSIDE2                                             00332900
      L = NODERM(M,N)                                                   00333000
      IF(L.EQ.0) GO TO 50                                               00333100
      RATE(L,K) = RXN(I)                                                00333200
   50 CONTINUE                                                          00333300
  100 CONTINUE                                                          00333400
  150 CONTINUE                                                          00333500
      RETURN                                                            00333600
      END                                                               00333700
      SUBROUTINE TEMPCR(K,NJ,T2,T1,THETA)                               00333800
      COMMON/RATES/RATE(160,15),DUMMY(15),RM(10),RXN(10),DTD,TEMP       00333900
      TFACTR = THETA**(T2-T1)                                           00334000
      DO 100 J=1,NJ                                                     00334100
      RATE(J,K) = RATE(J,K) * TFACTR                                    00334200
  100 CONTINUE                                                          00334300
      RETURN                                                            00334400
      END                                                               00334500
      SUBROUTINE INUNIT(INOPT,K,NJ)                                     00334600
      COMMON/RATES/RATE(160,15),THETA(15),RM(10),RXN(10),DTD,TEMP       00334700
      GO TO (100,200),INOPT                                             00334800
  100 CONTINUE                                                          00334900
      DO 110 J=1,NJ                                                     00335000
      RATE(J,K) = 1.0 - EXP(-RATE(J,K)*DTD)                             00335100
  110 CONTINUE                                                          00335200
      RETURN                                                            00335300
  200 CONTINUE                                                          00335400
      DO 210 J=1,NJ                                                     00335500
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      RATE(J,K) = -(ALOG(1.0-RATE(J,K)))/DTD                                    00335600
  210 CONTINUE                                                                  00335700
      RETURN                                                                    00335800
      END                                                                       00335900
      SUBROUTINE ALGUPT                                                         00336000
      COMMON/FUNX/NCONS(5),CO(5,5),FUNC(12,5),CLIMIT(5),NCHLO,NAMM,NPHO,00336100
     1            NAD1,NAD2,NDO,NNO3                                           00336200
      COMMON/PAR/CSAT,CDO,REOXK,SODD,PHOTOM,RESPM,CKT,CXT,AMUP,PHUP,DNK 00336300
      WRITE(6,100)                                                              00336400
  100 FORMAT(1H1,10X,' ALGAL UPTAKE OF NITROGEN AND PHOSPHORUS HAS NOT B00336500
     1EEN PROGRAMMED FOR DYNDELA ')                                             00336600
      RETURN                                                                    00336700
      END                                                                       00336800
C                                                                               00336900
C*******************************************************************************00337000
C                                                                               00337100
C                          DATA OUTPUT SUBROUTINES                              00337200
C                                                                               00337300
C*******************************************************************************00337400
C                                                                               00337500
      SUBROUTINE DKTABL(INOPT,NJ,NUMCON,T)                                      00337600
      COMMON/ALPH/ALPHA(220),BLANKF(20)                                         00337700
      COMMON/RATES/RATE(160,15),THETA(15),RM(10),RXN(10),DTD,TEMP       00337800
      COMMON/FUNX/NCONS(5),CO(5,5),FUNC(12,5),CLIMIT(5),NCHLO,NAMM,NPHO,00337900
     1            NAD1,NAD2,NDO,NNO3                                            00338000
      GO TO (100,200,300,400),INOPT                                             00338100
  100 CONTINUE                                                                  00338200
C******* INITIALIZE DECAY ARRAYS *******                                        00338300
      DO 50 I=1,5                                                               00338400
      II=I+5                                                                    00338500
      III=I+10                                                                  00338600
      DO 25 J=1,NJ                                                              00338700
      RATE(J,I)=0.0                                                             00338800
      RATE(J,II)=0.0                                                            00338900
      RATE(J,III)=0.0                                                           00339000
      THETA(I)=1.0                                                              00339100
      THETA(II)=1.0                                                             00339200
      THETA(III)=1.0                                                            00339300
   25 CONTINUE                                                                  00339400
   50 CONTINUE                                                                  00339500
      RETURN                                                                    00339600
  200 CONTINUE                                                                  00339700
C******* PRINT DECAY TABLE WITH DO BUDGET PARAMETERS *******                    00339800
      WRITE(6,1100)  T                                                          00339900
      WRITE(6,119) (ALPHA(I),I=61,80)                                           00340000
      DO 210 K=1,NUMCON                                                         00340100
      K1 = 101 + 20*K                                                           00340200
      K2 = K1 + 19                                                              00340300
      WRITE(6,64380) (ALPHA(I),I=K1,K2)                                         00340400
  210 CONTINUE                                                                  00340500
      WRITE(6,1150) NAD1,NAD2                                                   00340600
      DO 250 J=1,NJ                                                             00340700
      WRITE(6,1151) J,(RATE(J,K),K=1,15)                                        00340800
  250 CONTINUE                                                                  00340900
      WRITE(6,1154) (THETA(K),K=1,15)                                           00341000
      RETURN                                                                    00341100
  300 CONTINUE                                                                  00341200
C******* PRINT DECAY TABLE WITHOUT DO BUDGET *******                           00341300
      WRITE(6,1100)  T                                                          00341400
      WRITE(6,119) (ALPHA(I),I=61,80)                                           00341500
      DO 310 K=1,NUMCON                                                         00341600
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      K1 = 101 + 20*K                                                    00341700
      K2 = K1 + 19                                                       00341800
      WRITE(6,64380) (ALPHA(I),I=K1,K2)                                  00341900
  310 CONTINUE                                                           00342000
      WRITE(6,1250) NAD1,NAD2                                            00342100
      DO 350 J=1,NJ                                                      00342200
      WRITE(6,1251)J,(RATE(J,K),K=1,7)                                   00342300
  350 CONTINUE                                                           00342400
      WRITE(6,1254) (THETA(K),K=1,7)                                     00342500
      RETURN                                                             00342600
  400 CONTINUE                                                           00342700
C******* PRINT TABLE OF DO BUDGET PARAMETERS *******                    00342800
      WRITE(6,1350)                                                      00342900
      DO 450 J=1,NJ                                                      00343000
      WRITE(6,1351) J,RATE(J,NDO),(RATE(J,K),K=8,15)                     00343100
  450 CONTINUE                                                           00343200
      WRITE(6,1354)THETA(NDO),(THETA(K),K=8,15)                          00343300
  119 FORMAT(1H0/26X,20A4///)                                            00343400
 1100 FORMAT(1H1,49X,25H TABLE OF DECAY RATES (AT,F4.0,3H C)//)          00343500
 1150 FORMAT(1H0//                                                      00343600
     1        125H        ******** PRIMARY DECAY RATES *******    SECOND00343700
     2ARY     ********** SPECIAL DO BUDGET RATES AND PARAMETERS ******00343800
     3****/17X,16H  1/DAY (BASE E)          ,14X,12H DECAY 1/DAY/61X,64H  00343900
     4WINDSP  WINDOX    SOD   CHLORO   PHOTO   RESP   DEPTHP   DEPTH/52H00344000
     5 NODE  CONST1  CONST2  CONST3  CONST4  CONST5  CONST,I1,7H  CONST,00344100
     6I1,64H    MPH    1/DAY  G/MM/D   UG/L     MG/CHLORO/D      FT     00344200
     7 FT /5H ----,15(2X,6(1H-)))                                        00344300
 1151 FORMAT (I4,1X,7F8.3,F7.1,F9.3,2F8.2,2F8.3,2F8.2)                   00344400
 1154 FORMAT (1H0//41X,39H TEMPERATURE CORRECTION FACTORS , THETA//5X,   00344500
     1  15F8.3)                                                          00344600
 1250 FORMAT(1H0//                                                      00344700
     1******** PRIMARY DECAY RATES *******    SECONDARY/51X,16H  1/DAY00344800
     2 (BASE E),14X,12H DECAY 1/DAY//34X,52H NODE  CONST1  CONST2  CONST00344900
     33  CONST4  CONST5  CONST,I1,7H  CONST,I1/34X,5H ----,7(2X,6(1H-)))00345000
 1251 FORMAT(34X,I4,1X,7F8.3)                                           00345100
 1254 FORMAT (1H0/41X,39H TEMPERATURE CORRECTION FACTORS , THETA//39X,   00345200
     1    7F8.3)                                                        00345300
 1350 FORMAT(1H1//35X,62H********** UPDATED DO BUDGET RATES AND PARAMET00345400
     1ERS  **********//                                                 00345500
     2            35X,62HWINDSP  WINDOX    SOD   CHLORO   PHOTO   RESP  00345600
     3 DEPTHP   DEPTH/                                                  00345700
     4            35X,61H  MPH    1/DAY  G/MM/D   UG/L     MG/CHLORO/D  00345800
     5    FT      FT/35X,8(6(1H-),2X))                                  00345900
 1351 FORMAT(1H /35X,F7.1,F9.3,2F8.2,2F8.3,2F8.2)                       00346000
 1354 FORMAT(1H0//45X,39H TEMPERATURE CORRECTION FACTORS , THETA//33X,   00346100
     1  8F8.3)                                                          00346200
64380 FORMAT(1H0,26X,20A4)                                              00346300
      RETURN                                                            00346400
      END                                                               00346500
      SUBROUTINE DATRF(J,NUMCON)                                        00346600
      COMMON/TRN/C(160,5),Y(160),TRNSC(5),LOGOP(5),DMULT(5),IADOP(5),   00346700
     *          IADDTR(2),IDATRF,IADTRF,MLTTRF,LOGTRF                   00346800
C******* INITIALIZE TRANSFORMATION CONSTITUENTS *******                 00346900
      ITRF=1                                                            00347000
      KADTRF=IADTRF                                                     00347100
      DO 100 K=1,NUMCON                                                 00347200
      TRNSC(K) = C(J,K)                                                 00347300
  100 CONTINUE                                                          00347400
      IF(NUMCON.EQ.5) GO TO 102                                         00347500
      K1=NUMCON+1                                                       00347600
      DO 101 K=K1,5                                                     00347700
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      TRNSC(K) = 0.0                                                    00347800
101   CONTINUE                                                          00347900
102   CONTINUE                                                          00348000
      IF(MLTTRF.EQ.ITRF) GO TO 114                                      00348100
      IF(LOGTRF.EQ.ITRF) GO TO 116                                      00348200
      IF(KADTRF.NE.0) GO TO 104                                         00348300
      ITRF=ITRF+1                                                       00348400
      IF(ITRF.GE.4) RETURN                                              00348500
      GO TO 102                                                         00348600
C*******  ADDITION TRANSFORMATION  *******                             00348700
104   CONTINUE                                                          00348800
      DO 107 I=1,2                                                      00348900
      IF(IADDTR(I).EQ.0) GO TO 107                                      00349000
      IADTRF = IADDTR(I)                                                00349100
      TRNSC(IADTRF) = 0.0                                               00349200
      DO 105 K=1,5                                                      00349300
      IF(IADOP(K).EQ.0) GO TO 105                                       00349400
      TRNSC(IADTRF) = TRNSC(IADTRF) + TRNSC(K)                          00349500
105   CONTINUE                                                          00349600
107   CONTINUE                                                          00349700
      ITRF=ITRF+1                                                       00349800
      KADTRF=0                                                          00349900
      GO TO 102                                                         00350000
C*******  MULTIPLICATION TRANSFORMATION  *******                       00350100
114   CONTINUE                                                          00350200
      DO 115 K=1,5                                                      00350300
      TRNSC(K) = TRNSC(K) * DMULT(K)                                    00350400
115   CONTINUE                                                          00350500
      ITRF=ITRF+1                                                       00350600
      GO TO 102                                                         00350700
C*******  LOG(10) TRANSFORMATION  *******                              00350800
116   CONTINUE                                                          00350900
      DO 117 K=1,5                                                      00351000
      IF(LOGOP(K).EQ.0) GO TO 117                                       00351100
      IF(TRNSC(K).LE.0.0) TRNSC(K)=0.0001                               00351200
      TRNSC(K) = ALOG10(TRNSC(K))                                       00351300
117   CONTINUE                                                          00351400
      ITRF=ITRF+1                                                       00351500
      GO TO 102                                                         00351600
      END                                                               00351700
      SUBROUTINE SWTABL(I,IIP)                                          00351800
      COMMON NSPEC,DELTQ,NUMCON,NALPHA,NJ,KZOP,                         00351900
     1  NTIMES,CTIME1,CTIME                                             00352000
      COMMON/A/GMAX(5),GMIN(5),NGJUNC(20),NGST(20),NGEND(20),           00352100
     1   NGCON(20,5),NGCYC,NBRCON,NGINT(20)                             00352200
      COMMON/WNF/RMNODE(160),FGSWQ(99,5),FGSWA(99),IWFSCY,ICYC,IGCF(5), 00352300
     1 KSLACK,IWF,IWFFCY,INODOR(99),NMODE,NODERM(100,3)                 00352400
      COMMON/STAB/NPC(120),NOPRT(120),KTABLE(120),JPPT(120,30),KSL(120) 00352500
      COMMON/TRN/C(160,5),Y(160),TRNSC(5),LOGOP(5),DMULT(5),IADOP(5),   00352600
     *           IADDTR(2),IDATPF,IADTRF,MLTTRF,LOGTRF                  00352700
      IF(IIP.GT.0) GO TO 500                                            00352800
      IF(NMODE.EQ.2) GO TO 200                                          00352900
      IF(KSL(I).EQ.3) GO TO 100                                         00353000
C*******  SET HIGH SLACK 1-D TABLE PARAMETERS  *******                 00353100
      KTAB=KTABLE(I)                                                    00353200
      KTABLE(I)=1                                                       00353300
      NOPRT(I)=2                                                        00353400
      JPRT(I,1)=2                                                       00353500
      JPRT(I,2)=11                                                      00353600
      DO 90 II=1,7                                                      00353700
      III=I                                                             00353800
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      I=I+1                                                          00353900
      NPC(I)=NPC(III)+1                                              00354000
      KSL(I)=1                                                       00354100
      KTABLE(I)=0                                                    00354200
      GO TO (10,20,30,40,50,60,70),II                                00354300
10    CONTINUE                                                       00354400
      NOPRT(I)=3                                                     00354500
      JPRT(I,1)= 12                                                  00354600
      JPRT(I,3)= 20                                                  00354700
      JPRT(I,2)= 13                                                  00354800
      GO TO 90                                                       00354900
20    CONTINUE                                                       00355000
      NOPRT(I)=5                                                     00355100
      JPRT(I,1)= 22                                                  00355200
      JPRT(I,2)= 23                                                  00355300
      JPRT(I,3)= 24                                                  00355400
      JPRT(I,4)= 25                                                  00355500
      JPRT(I,5)= 31                                                  00355600
      GO TO 90                                                       00355700
30    CONTINUE                                                       00355800
      NOPRT(I)=5                                                     00355900
      JPRT(I,1)= 32                                                  00356000
      JPRT(I,2)= 33                                                  00356100
      JPRT(I,3)= 34                                                  00356200
      JPRT(I,4)= 36                                                  00356300
      JPRT(I,5)= 38                                                  00356400
      GO TO 90                                                       00356500
40    CONTINUE                                                       00356600
      NOPRT(I)=5                                                     00356700
      JPRT(I,1)= 42                                                  00356800
      JPRT(I,2)= 43                                                  00356900
      JPRT(I,3)= 44                                                  00357000
      JPRT(I,4)= 48                                                  00357100
      JPRT(I,5)= 49                                                  00357200
      GO TO 90                                                       00357300
50    CONTINUE                                                       00357400
      NOPRT(I)=7                                                     00357500
      JPRT(I,1)= 51                                                  00357600
      JPRT(I,2)= 52                                                  00357700
      JPRT(I,3)= 55                                                  00357800
      JPRT(I,4)= 56                                                  00357900
      JPRT(I,5)= 58                                                  00358000
      JPRT(I,6)= 59                                                  00358100
      JPRT(I,7)= 60                                                  00358200
      GO TO 90                                                       00358300
60    CONTINUE                                                       00358400
      NOPRT(I)=9                                                     00358500
      JPRT(I,1)= 62                                                  00358600
      JPRT(I,2)= 63                                                  00358700
      JPRT(I,3)= 64                                                  00358800
      JPRT(I,4)= 66                                                  00358900
      JPRT(I,5)= 68                                                  00359000
      JPRT(I,6)= 69                                                  00359100
      JPRT(I,7)= 70                                                  00359200
      JPRT(I,8)= 71                                                  00359300
      JPRT(I,9)= 72                                                  00359400
      GO TO 90                                                       00359500
70    CONTINUE                                                       00359600
      NOPRT(I)=3                                                     00359700
      JPRT(I,1)= 74                                                  00359800
      JPRT(I,2)= 75                                                  00359900
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      JPRT(I,3)= 76                                                     00360000
90    CONTINUE                                                          00360100
      KTABLE(I)=KTAB                                                    00360200
      RETURN                                                            00360300
100   CONTINUE                                                          00360400
C*******  SET LOW  SLACK 1-D TABLE PARAMETERS  *******                  00360500
      KTAB=KTABLE(I)                                                    00360600
      KTABLE(I)=1                                                       00360700
      NOPRT(I)=2                                                        00360800
      JPRT(I,1)=2                                                       00360900
      JPRT(I,2)=11                                                      00361000
      DO 190 II=1,10                                                    00361100
      III=I                                                             00361200
      I=I+1                                                             00361300
      NPC(I)=NPC(III)+1                                                 00361400
      KSL(I)=3                                                          00361500
      KTABLE(I)=0                                                       00361600
      GO TO (110,115,120,125,130,135,140,145,150,155),II                00361700
110   CONTINUE                                                          00361800
      NOPRT(I)=3                                                        00361900
      JPRT(I,1)= 12                                                     00362000
      JPRT(I,2)= 13                                                     00362100
      JPRT(I,3)= 20                                                     00362200
      GO TO 190                                                         00362300
115   CONTINUE                                                          00362400
      NOPRT(I)=4                                                        00362500
      JPRT(I,1)= 22                                                     00362600
      JPRT(I,2)= 23                                                     00362700
      JPRT(I,3)= 24                                                     00362800
      JPRT(I,4)= 25                                                     00362900
      GO TO 190                                                         00363000
120   CONTINUE                                                          00363100
      NOPRT(I)=4                                                        00363200
      JPRT(I,1)= 31                                                     00363300
      JPRT(I,2)= 32                                                     00363400
      JPRT(I,3)= 33                                                     00363500
      JPRT(I,4)= 34                                                     00363600
      GO TO 190                                                         00363700
125   CONTINUE                                                          00363800
      NOPRT(I)=4                                                        00363900
      JPRT(I,1)= 36                                                     00364000
      JPRT(I,2)= 38                                                     00364100
      JPRT(I,3)= 42                                                     00364200
      JPRT(I,4)= 43                                                     00364300
      GO TO 190                                                         00364400
130   CONTINUE                                                          00364500
      NOPRT(I)=4                                                        00364600
      JPRT(I,1)= 44                                                     00364700
      JPRT(I,2)= 48                                                     00364800
      JPRT(I,3)= 49                                                     00364900
      JPRT(I,4)= 51                                                     00365000
      GO TO 190                                                         00365100
135   CONTINUE                                                          00365200
      NOPRT(I)=4                                                        00365300
      JPRT(I,1)= 52                                                     00365400
      JPRT(I,2)= 55                                                     00365500
      JPRT(I,3)= 56                                                     00365600
      JPRT(I,4)= 58                                                     00365700
      GO TO 190                                                         00365800
140   CONTINUE                                                          00365900
      NOPRT(I)=5                                                        00366000
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      JPRT(I,1)= 59                                                    00366100
      JPRT(I,2)= 60                                                    00366200
      JPRT(I,3)= 62                                                    00366300
      JPRT(I,4)= 63                                                    00366400
      JPRT(I,5)= 64                                                    00366500
      GO TO 190                                                        00366600
145   CONTINUE                                                         00366700
      NOPRT(I)=5                                                       00366800
      JPRT(I,1)= 66                                                    00366900
      JPRT(I,2)= 68                                                    00367000
      JPRT(I,3)= 69                                                    00367100
      JPRT(I,4)= 70                                                    00367200
      JPRT(I,5)= 71                                                    00367300
      GO TO 190                                                        00367400
150   CONTINUE                                                         00367500
      NOPRT(I)=2                                                       00367600
      JPRT(I,1)= 72                                                    00367700
      JPRT(I,2)= 74                                                    00367800
      JPRT(I,3)= 75                                                    00367900
      GO TO 190                                                        00368000
155   CONTINUE                                                         00368100
      NOPRT(I)=1                                                       00368200
      JPRT(I,1)= 76                                                    00368300
190   CONTINUE                                                         00368400
      KTABLE(I)=KTAB                                                   00368500
      RETURN                                                           00368600
200   CONTINUE                                                         00368700
      IF(KSL(I).EQ.3) GO TO300                                         00368800
C*******  SET HIGH SLACK 2-D TABLE PARAMETERS  *******                 00368900
      KTAB=KTABLE(I)                                                   00369000
      KTABLE(I)=1                                                      00369100
      NOPRT(I)=1                                                       00369200
      JPRT(I,1)=11                                                     00369300
      DO 290 II=1,7                                                    00369400
      III=I                                                            00369500
      I=I+1                                                            00369600
      NPC(I)=NPC(III)+1                                                00369700
      KSL(I)=1                                                         00369800
      KTABLE(I)=0                                                      00369900
      GO TO (210,220,230,240,250,260,270),II                           00370000
210   CONTINUE                                                         00370100
      NOPRT(I)=1                                                       00370200
      JPRT(I,1)= 20                                                    00370300
      GO TO 290                                                        00370400
220   CONTINUE                                                         00370500
      NOPRT(I)=7                                                       00370600
      JPRT(I,1)= 22                                                    00370700
      JPRT(I,2)= 23                                                    00370800
      JPRT(I,3)= 24                                                    00370900
      JPRT(I,4)= 25                                                    00371000
      JPRT(I,5)= 26                                                    00371100
      JPRT(I,6)= 58                                                    00371200
      JPRT(I,7)= 89                                                    00371300
      GO TO 290                                                        00371400
230   CONTINUE                                                         00371500
      NOPRT(I)=17                                                      00371600
      JPRT(I,1)= 28                                                    00371700
      JPRT(I,2)= 29                                                    00371800
      JPRT(I,3)= 30                                                    00371900
      JPRT(I,4)= 31                                                    00372000
      JPRT(I,5)= 32                                                    00372100
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      JPRT(I,6)= 33                                                    00372200
      JPRT(I,7)= 59                                                    00372300
      JPRT(I,8)= 60                                                    00372400
      JPRT(I,9)= 61                                                    00372500
      JPRT(I,10)=62                                                    00372600
      JPRT(I,11)=63                                                    00372700
      JPRT(I,12)=68                                                    00372800
      JPRT(I,13)=65                                                    00372900
      JPRT(I,14)=91                                                    00373000
      JPRT(I,15)=92                                                    00373100
      JPRT(I,16)=93                                                    00373200
      JPRT(I,17)=96                                                    00373300
      GO TO 290                                                        00373400
240   CONTINUE                                                         00373500
      NOPRT(I)=30                                                      00373600
      JPRT(I,1)= 36                                                    00373700
      JPRT(I,2)= 37                                                    00373800
      JPRT(I,3)= 38                                                    00373900
      JPRT(I,4)= 39                                                    00374000
      JPRT(I,5)= 40                                                    00374100
      JPRT(I,6)= 41                                                    00374200
      JPRT(I,7)= 42                                                    00374300
      JPRT(I,8)= 43                                                    00374400
      JPRT(I,9)= 44                                                    00374500
      JPRT(I,10)=45                                                    00374600
      JPRT(I,11)=66                                                    00374700
      JPRT(I,12)=72                                                    00374800
      JPRT(I,13)=68                                                    00374900
      JPRT(I,14)=69                                                    00375000
      JPRT(I,15)=70                                                    00375100
      JPRT(I,16)=71                                                    00375200
      JPRT(I,17)=72                                                    00375300
      JPRT(I,18)=73                                                    00375400
      JPRT(I,19)=74                                                    00375500
      JPRT(I,20)=75                                                    00375600
      JPRT(I,21)=76                                                    00375700
      JPRT(I,22)=98                                                    00375800
      JPRT(I,23)=99                                                    00375900
      JPRT(I,24)=100                                                   00376000
      JPRT(I,25)=101                                                   00376100
      JPRT(I,26)=102                                                   00376200
      JPRT(I,27)=103                                                   00376300
      JPRT(I,28)=104                                                   00376400
      JPRT(I,29)=105                                                   00376500
      JPRT(I,30)=106                                                   00376600
      GO TO 290                                                        00376700
250   CONTINUE                                                         00376800
      NOPRT(I)=30                                                      00376900
      JPRT(I,1)= 46                                                    00377000
      JPRT(I,2)= 47                                                    00377100
      JPRT(I,3)= 48                                                    00377200
      JPRT(I,4)= 49                                                    00377300
      JPRT(I,5)= 50                                                    00377400
      JPRT(I,6)= 52                                                    00377500
      JPRT(I,7)= 54                                                    00377600
      JPRT(I,8)= 56                                                    00377700
      JPRT(I,9)= 57                                                    00377800
      JPRT(I,10)=77                                                    00377900
      JPRT(I,11)=78                                                    00378000
      JPRT(I,12)=83                                                    00378100
      JPRT(I,13)=80                                                    00378200
```

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      JPRT(I,14)=81                                                     00378300
      JPRT(I,15)=82                                                     00378400
      JPRT(I,16)=83                                                     00378500
      JPRT(I,17)=84                                                     00378600
      JPRT(I,18)=85                                                     00378700
      JPRT(I,19)=86                                                     00378800
      JPRT(I,20)=87                                                     00378900
      JPRT(I,21)=88                                                     00379000
      JPRT(I,22)=107                                                    00379100
      JPRT(I,23)=108                                                    00379200
      JPRT(I,24)=109                                                    00379300
      JPRT(I,25)=111                                                    00379400
      JPRT(I,26)=112                                                    00379500
      JPRT(I,27)=114                                                    00379600
      JPRT(I,28)=116                                                    00379700
      JPRT(I,29)=118                                                    00379800
      JPRT(I,30)=119                                                    00379900
      GO TO 290                                                         00380000
  260 CONTINUE                                                          00380100
      NOPRT(I)=11                                                       00380200
      JPRT(I,1)= 120                                                    00380300
      JPRT(I,2)= 121                                                    00380400
      JPRT(I,3)= 122                                                    00380500
      JPRT(I,4)= 124                                                    00380600
      JPRT(I,5)= 125                                                    00380700
      JPRT(I,6)= 127                                                    00380800
      JPRT(I,7)= 129                                                    00380900
      JPRT(I,8)= 131                                                    00381000
      JPRT(I,9)= 133                                                    00381100
      JPRT(I,10)=136                                                    00381200
      JPRT(I,11)=138                                                    00381300
      GO TO 290                                                         00381400
  270 CONTINUE                                                          00381500
      NOPRT(I)=2                                                        00381600
      JPRT(I,1)= 139                                                    00381700
      JPRT(I,2)= 140                                                    00381800
  290 CONTINUE                                                          00381900
      KTABLE(I)=KTAB                                                    00382000
      RETURN                                                            00382100
  300 CONTINUE                                                          00382200
C*******  SET LOW  SLACK 2-D TABLE PARAMETERS  *******                  00382300
      KTAB=KTABLE(I)                                                    00382400
      KTABLE(I)=1                                                       00382500
      NOPRT(I)=1                                                        00382600
      JPRT(I,1)=11                                                      00382700
      DO 390 II=1,10                                                    00382800
      III=I                                                             00382900
      I=I+1                                                             00383000
      NPC(I)=NPC(III)+1                                                 00383100
      KSL(I)=3                                                          00383200
      KTABLE(I)=0                                                       00383300
      GO TO (310,315,320,325,330,335,340,345,350,355),II                00383400
  310 CONTINUE                                                          00383500
      NOPRT(I)=1                                                        00383600
      JPRT(I,1)= 20                                                     00383700
      GO TO 390                                                         00383800
  315 CONTINUE                                                          00383900
      NOPRT(I)=4                                                        00384000
      JPRT(I,1)= 22                                                     00384100
      JPRT(I,2)= 23                                                     00384200
      JPRT(I,3)= 24                                                     00384300
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      JPRT(I,4)= 25                                                    00384400
      GO TO 390                                                        00384500
320   CONTINUE                                                         00384600
      NOPRT(I)=13                                                      00384700
      JPRT(I,1)= 26                                                    00384800
      JPRT(I,2)= 28                                                    00384900
      JPRT(I,3)= 29                                                    00385000
      JPRT(I,4)= 30                                                    00385100
      JPRT(I,5)= 58                                                    00385200
      JPRT(I,6)= 59                                                    00385300
      JPRT(I,7)= 60                                                    00385400
      JPRT(I,8)= 61                                                    00385500
      JPRT(I,9)= 62                                                    00385600
      JPRT(I,10)=89                                                    00385700
      JPRT(I,11)=91                                                    00385800
      JPRT(I,12)=64                                                    00385900
      JPRT(I,13)=93                                                    00386000
      GO TO 390                                                        00386100
325   CONTINUE                                                         00386200
      NOPRT(I)=17                                                      00386300
      JPRT(I,1)= 31                                                    00386400
      JPRT(I,2)= 32                                                    00386500
      JPRT(I,3)= 33                                                    00386600
      JPRT(I,4)= 36                                                    00386700
      JPRT(I,5)= 37                                                    00386800
      JPRT(I,6)= 38                                                    00386900
      JPRT(I,7)= 63                                                    00387000
      JPRT(I,8)= 64                                                    00387100
      JPRT(I,9)= 65                                                    00387200
      JPRT(I,10)=66                                                    00387300
      JPRT(I,11)=67                                                    00387400
      JPRT(I,12)=67                                                    00387500
      JPRT(I,13)=69                                                    00387600
      JPRT(I,14)=96                                                    00387700
      JPRT(I,15)=98                                                    00387800
      JPRT(I,16)=99                                                    00387900
      JPRT(I,17)=100                                                   00388000
      GO TO 390                                                        00388100
330   CONTINUE                                                         00388200
      NOPRT(I)=26                                                      00388300
      JPRT(I,1)= 39                                                    00388400
      JPRT(I,2)= 40                                                    00388500
      JPRT(I,3)= 41                                                    00388600
      JPRT(I,4)= 42                                                    00388700
      JPRT(I,5)= 43                                                    00388800
      JPRT(I,6)= 44                                                    00388900
      JPRT(I,7)= 45                                                    00389000
      JPRT(I,8)= 46                                                    00389100
      JPRT(I,9)= 47                                                    00389200
      JPRT(I,10)=70                                                    00389300
      JPRT(I,11)=71                                                    00389400
      JPRT(I,12)=79                                                    00389500
      JPRT(I,13)=73                                                    00389600
      JPRT(I,14)=74                                                    00389700
      JPRT(I,15)=75                                                    00389800
      JPRT(I,16)=76                                                    00389900
      JPRT(I,17)=77                                                    00390000
      JPRT(I,18)=78                                                    00390100
      JPRT(I,19)=101                                                   00390200
      JPRT(I,20)=102                                                   00390300
      JPRT(I,21)=103                                                   00390400
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      JPRT(I,22)=104                                                    00390500
      JPRT(I,23)=105                                                    00390600
      JPRT(I,24)=106                                                    00390700
      JPRT(I,25)=107                                                    00390800
      JPRT(I,26)=108                                                    00390900
      GO TO 390                                                         00391000
335   CONTINUE                                                          00391100
      NOPRT(I)=24                                                       00391200
      JPRT(I,1)= 48                                                     00391300
      JPRT(I,2)= 49                                                     00391400
      JPRT(I,3)= 50                                                     00391500
      JPRT(I,4)= 52                                                     00391600
      JPRT(I,5)= 54                                                     00391700
      JPRT(I,6)= 56                                                     00391800
      JPRT(I,7)= 57                                                     00391900
      JPRT(I,8)= 79                                                     00392000
      JPRT(I,9)= 80                                                     00392100
      JPRT(I,10)=81                                                     00392200
      JPRT(I,11)=82                                                     00392300
      JPRT(I,12)=92                                                     00392400
      JPRT(I,13)=84                                                     00392500
      JPRT(I,14)=85                                                     00392600
      JPRT(I,15)=86                                                     00392700
      JPRT(I,16)=87                                                     00392800
      JPRT(I,17)=88                                                     00392900
      JPRT(I,18)=109                                                    00393000
      JPRT(I,19)=111                                                    00393100
      JPRT(I,20)=112                                                    00393200
      JPRT(I,21)=114                                                    00393300
      JPRT(I,22)=116                                                    00393400
      JPRT(I,23)=118                                                    00393500
      JPRT(I,24)=119                                                    00393600
      GO TO 390                                                         00393700
340   CONTINUE                                                          00393800
      NOPRT(I)=5                                                        00393900
      JPRT(I,1)= 120                                                    00394000
      JPRT(I,2)= 121                                                    00394100
      JPRT(I,3)= 122                                                    00394200
      JPRT(I,4)= 124                                                    00394300
      JPRT(I,5)= 125                                                    00394400
      GO TO 390                                                         00394500
345   CONTINUE                                                          00394600
      NOPRT(I)=5                                                        00394700
      JPRT(I,1)= 127                                                    00394800
      JPRT(I,2)= 129                                                    00394900
      JPRT(I,3)= 131                                                    00395000
      JPRT(I,4)= 133                                                    00395100
      JPRT(I,5)= 136                                                    00395200
      GO TO 390                                                         00395300
350   CONTINUE                                                          00395400
      NOPRT(I)=2                                                        00395500
      JPRT(I,1)= 138                                                    00395600
      JPRT(I,2)= 140                                                    00395700
      GO TO 390                                                         00395800
355   CONTINUE                                                          00395900
      NOPRT(I)=1                                                        00396000
      JPRT(I,1)= 141                                                    00396100
390   CONTINUE                                                          00396200
      KTABLE(I)=KTAB                                                    00396300
      RETURN                                                            00396400
500   CONTINUE                                                          00396500
```

```
C*******  PRINT SLACK WATER TABLE  *******
      HOURS = DELTQ * FLOAT (ICYC) / 3600.0 + CTIME1
      KDAYS = HOURS / 23.99999
      HOURS=CTIME
      IF(KSL(I).EQ.0) GO TO 8668
      IF(KTABLE(I).EQ.1) GO TO 8662
C*******  CONTINUE OLD SLACK WATER TABLE  *******
      WRITE(6,129)
      WRITE(6,8670) ICYC,KDAYS,HOURS
      GO TO 8669
8662  CONTINUE
C*******  BEGIN NEW SLACK WATER TABLE  *******
      IWFSCY=ICYC
      IWF=0
      IF(KSL(I).EQ.3) GO TO 8665
      WRITE(6,8671)
      GO TO 8666
8665  CONTINUE
      WRITE(6,8672)
8666  CONTINUE
      WRITE(6,8673) ICYC,KDAYS,HOURS
      GO TO 8669
8668  CONTINUE
C*******  BEGIN SNAPSHOT TABLE  *******
      IWFSCY=ICYC
      IWF=0
      WRITE(6,530) ICYC,KDAYS,HOURS
8669  CONTINUE
C*******  PRINT DATA FROM PRESENT CYCLE  *******
      NOP = NOPRT(I)
      DO 534 L=1,NOP
      J = JPRT(I,L)
C*******  PREPARE PLOT CONTROL INFORMATION  *******
      IWF=IWF+1
      IF(IWF.GT.99) WRITE(6,91425)
91425 FORMAT('1  NUMBER OF PLOTTER PTS EXFED ARRAY DIMENSIONS')
      INODOR(IWF)=J
C*******  CHECK FOR DATA TRANSFORMATIONS  *******
      IF(IDATRF.EQ.0) GO TO 96007
      CALL DATRF(J,NUMCON)
      WRITE(6,532) J,Y(J),(TRNSC(K),K=1,5)
      DO 99882 LWF=1,5
      FGSWO(IWF,LWF) = TRNSC(LWF)
99882 CONTINUE
      GO TO 96008
96007 CONTINUE
      WRITE(6,532) J,Y(J),(C(J,K),K=1,NUMCON)
      DO 99881  LWF=1,NUMCON
99881 FGSWO(IWF,LWF)=C(J,LWF)
96008 CONTINUE
      FGSWA(IWF)=RMNODE(J)
  534 CONTINUE
      IIP = I
129   FORMAT (132(1H_))
  530 FORMAT(1H1////
     *       35H SYSTEM STATUS AFTER QUALITY CYCLE I4,I12,6H DAYS,
     * F6.2,6H HOURS//
     *      109H                              **************************
     *  CONCENTRATION FACTORS    **************************/
     *      109H JUNCTION     HEAD           1ST. CONSTIT.    2ND. CONSTI
     *T.    3RD. CONSTIT.    4TH. CONSTIT.    5TH. CONSTIT./
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     *      ,105H  NUMBER       (FT)                (MGL)               (MGL)  00402700
     *          (MGL)             (MGL)               (MGL)/)                  00402800
   532 FORMAT(1H0I5,F12.4,F20.2,4F17.2)                                         00402900
 8670  FORMAT(1H ,27X,7H CYCLE ,I4,I12,6H DAYS,,F6.2,6H HOURS)                  00403000
 8671  FORMAT(1H1//48X,23H HIGH SLACK PREDICTIONS/)                             00403100
 8672  FORMAT(1H1//48X,23H  LOW SLACK PREDICTIONS/)                             00403200
 8673  FORMAT(1H0/                                                            00403300
     *      109H                                 ****************************  00403400
     *  CONCENTRATION FACTORS    ****************************/                  00403500
     *      109H JUNCTION      HEAD           1ST. CONSTIT.    2ND. CONSTI00403600
     *T.    3RD. CONSTIT.    4TH. CONSTIT.    5TH. CONSTIT./                   00403700
     *      105H  NUMBER       (FT)                (MGL)               (MGL)  00403800
     *          (MGL)             (MGL)               (MGL)/                   00403900
     C           28X,7H CYCLE ,I4,I12,6H DAYS,,F6.2,6H HOURS)                  00404000
      RETURN                                                                    00404100
      END                                                                       00404200
C*****************************************************************************00404300
C                            SUBROUTINE SUMARY                                00404400
C*****************************************************************************00404500
      SUBROUTINE SUMARY(IP,LP,PLT,NUM,NMODE)                                    00404600
      COMMON/QLXQXP/ FGQXO(3,6,99),FGQXA(99),KDAYS1,HOURS1,KDAYS2,HOURS200404700
      DIMENSION CMIN1(160,5), CMAX1(160,5), CAVG1(160,5), CMIN2(160,5),  00404800
     *   CMAX2(160,5), CAVG2(160,5)                                           00404900
      COMMON/WNF/RMNODE(160),DUMMY1(595),ICYC,DUMMY2(408)                   00405000
      COMMON/TRN/C(160,5),Y(160),TRNSC(5),LOGOP(5),DMULT(5),IADOP(5),    00405100
     1          IADDTR(2),IDATRF,IADTRF,MLTTRF,LOGTRF,NUMC                  00405200
      COMMON NSPEC,DELTQ,NUMCON,NALPHA,NJ,KZOP,                             00405300
     1       NTIMES,CTIME1,CTIME,TSRISE,TSSET                               00405400
      GO TO (100,124), NUM                                                  00405500
C*************************   INITIALIZE SUMMARY 1   ***********************00405600
  100 IF (ICYC.GT.IP) GO TO 106                                             00405700
      IF (IDATRF.EQ.0) GO TO 105                                            00405800
C*******  TRANSFORMED DATA  *******                                        00405900
        DO 103 J=1,NJ                                                       00406000
          CALL DATRF(J,NUMCON)                                              00406100
          DO 101 K=1,NUMC                                                   00406200
            CMIN1(J,K) = TRNSC(K)                                           00406300
            CMAX1(J,K) = TRNSC(K)                                           00406400
            CAVG1(J,K) = TRNSC(K)                                           00406500
  101       CONTINUE                                                        00406600
   03     CONTINUE                                                         00406700
        RETURN                                                              00406800
  105   CONTINUE                                                          00406900
C*******  STRAIGHT DATA  *******                                           00407000
        DO 104 K=1,NUMCON                                                   00407100
          DO 102 J=1,NJ                                                     00407200
            CMIN1(J,K) = C(J,K)                                             00407300
            CMAX1(J,K) = C(J,K)                                             00407400
            CAVG1(J,K) = C(J,K)                                             00407500
  102     CONTINUE                                                          00407600
  104   CONTINUE                                                          00407700
        RETURN                                                              00407800
  106 CONTINUE                                                          00407900
C*************************   COMPUTE MIN, MAX, AVG   ***********************00408000
      IF (IDATRF.EQ.0) GO TO 111                                            00408100
C*******  TRANSFORMED DATA  *******                                        00408200
      DO 109 J=1,NJ                                                         00408300
        CALL DATRF(J,NUMCON)                                                00408400
        DO 107 K=1,NUMC                                                     00408500
          IF(TRNSC(K).LT.CMIN1(J,K)) CMIN1(J,K)=TRNSC(K)                    00408600
          IF(TRNSC(K).GT.CMAX1(J,K)) CMAX1(J,K)=TRNSC(K)                    00408700
```

```
          CAVG1(J,K) = CAVG1(J,K) + TRNSC(K)
 107     CONTINUE
 109   CONTINUE
       GO TO 113
 111   CONTINUE
C*******  STRAIGHT DATA  *******
       DO 110 K=1,NUMCON
         DO 108 J=1,NJ
           IF (C(J,K).LT.CMIN1(J,K))  CMIN1(J,K) = C(J,K)
           IF (C(J,K).GT.CMAX1(J,K))  CMAX1(J,K) = C(J,K)
           CAVG1(J,K) = CAVG1(J,K) + C(J,K)
  108    CONTINUE
  110 CONTINUE
 113   CONTINUE
       IF (ICYC.NE.LP) RETURN
       DENOM = 1./FLOAT(LP - IP + 1)
       DO 114 K=1,NUMC
         DO 112 J=1,NJ
           CAVG1(J,K) = CAVG1(J,K) * DENOM
  112    CONTINUE
  114 CONTINUE
C***************************   WRITE SUMMARY TABLE 1   ******************
       HOURS1 = DELTQ * FLOAT(IP) / 3600. + CTIME1
       HOURS2 = DELTQ * FLOAT(LP) / 3600. + CTIME1
       KDAYS1 = HOURS1 / 24.
       KDAYS2 = HOURS2 / 24.
       HOURS2 = CTIME
       HOURS  = 24.0 * FLOAT(KDAYS1)
       HOURS1 = HOURS1 - HOURS
       WRITE (6,600) IP, KDAYS1, HOURS1, LP, KDAYS2, HOURS2
       WRITE (6,602)
       DO 116 J=1,NJ
         WRITE (6,604)J, (CMIN1(J,K), CMAX1(J,K), CAVG1(J,K), K=1,NUMC)
  116 CONTINUE
C*********************   CHECK FOR PLOTTING OF SUMMARY 1   *************
       IF (PLT.EQ.0) GO TO 122
       NP = 2**NMODE - 1
       DO 121 ISIDE=1,NP
       NPP = 0
       DO 120 J=1,NJ
         IF(RMNODE(J).GT.85.0) GO TO 120
         IF(NMODE.EQ.1) GO TO 1004
         GO TO (1001,1002,1003),ISIDE
 1001    CONTINUE
           IF(J.GT.25.AND.J.LT.58) GO TO 120
           IF(J.GT.88.AND.J.LT.120) GO TO 120
           GO TO 1004
 1002    CONTINUE
           IF(J.GT.25.AND.J.LT.58) GO TO 1004
           GO TO 120
 1003    CONTINUE
           IF(J.GT.88.AND.J.LT.120) GO TO 1004
           GO TO 120
 1004    CONTINUE
         NPP = NPP + 1
         IF (NPP.GT.99) WRITE (6,606)
           DO 118 LPP=1,5
             FGQXO(1,LPP,NPP) = CMAX1(J,LPP)
             FGQXO(2,LPP,NPP) = CAVG1(J,LPP)
             FGQXO(3,LPP,NPP) = CMIN1(J,LPP)
  118      CONTINUE
```

```
        FGQXA(NPP) = RMNODE(J)                                                  00414900
  120 CONTINUE                                                                  00415000
      CALL SUMPLT(IP,LP,ISIDE,NPP)                                              00415100
121   CONTINUE                                                                  00415200
  122 CONTINUE                                                                  00415300
      RETURN                                                                    00415400
C*************************   INITIALIZE SUMMARY 2   ********************00415500
  124 IF (ICYC.GT.IP) GO TO 130                                                 00415600
      IF (IDATRF.EQ.0) GO TO 129                                                00415700
C*******  TRANSFORMED DATA  *******                                            00415800
        DO 127 J=1,NJ                                                           00415900
          CALL DATRF(J,NUMCON)                                                  00416000
          DO 125 K=1,NUMC                                                       00416100
            CMIN2(J,K) = TRNSC(K)                                               00416200
            CMAX2(J,K) = TRNSC(K)                                               00416300
            CAVG2(J,K) = TRNSC(K)                                               00416400
125       CONTINUE                                                              00416500
127     CONTINUE                                                                00416600
        RETURN                                                                  00416700
129   CONTINUE                                                                  00416800
C*******  STRAIGHT DATA  *******                                                00416900
        DO 128 K=1,NUMCON                                                       00417000
          DO 126 J=2,NJ                                                         00417100
            CMIN2(J,K) = C(J,K)                                                 00417200
            CMAX2(J,K) = C(J,K)                                                 00417300
            CAVG2(J,K) = C(J,K)                                                 00417400
  126     CONTINUE                                                              00417500
  128   CONTINUE                                                                00417600
        RETURN                                                                  00417700
  130 CONTINUE                                                                  00417800
C*************************   COMPUTE MIN, MAX, AVG   ********************00417900
      IF (IDATRF.EQ.0) GO TO 135                                                00418000
C*******  TRANSFORMED DATA  *******                                            00418100
      DO 133 J=1,NJ                                                            00418200
        CALL DATRF(J,NUMCON)                                                    00418300
        DO 131 K=1,NUMC                                                         00418400
          IF(TRNSC(K).LT.CMIN2(J,K)) CMIN2(J,K)=TRNSC(K)                        00418500
          IF(TRNSC(K).GT.CMAX2(J,K)) CMAX2(J,K)=TRNSC(K)                        00418600
          CAVG2(J,K) = CAVG2(J,K) + TRNSC(K)                                    00418700
131     CONTINUE                                                                00418800
133   CONTINUE                                                                  00418900
      GO TO 137                                                                 00419000
135   CONTINUE                                                                  00419100
C*******  STRAIGHT DATA  *******                                                00419200
      DO 134 K=1,NUMCON                                                         00419300
        DO 132 J=1,NJ                                                           00419400
          IF (C(J,K).LT.CMIN2(J,K))  CMIN2(J,K) = C(J,K)                        00419500
          IF (C(J,K).GT.CMAX2(J,K))  CMAX2(J,K) = C(J,K)                        00419600
          CAVG2(J,K) = CAVG2(J,K) + C(J,K)                                      00419700
  132   CONTINUE                                                                00419800
  134 CONTINUE                                                                  00419900
137   CONTINUE                                                                  00420000
      IF (ICYC.NE.LP) RETURN                                                    00420100
      DENOM = 1./FLOAT(LP - IP + 1)                                             00420200
      DO 138 K=1,NUMC                                                           00420300
        DO 136 J=1,NJ                                                           00420400
          CAVG2(J,K) = CAVG2(J,K) * DENOM                                       00420500
  136   CONTINUE                                                                00420600
  138 CONTINUE                                                                  00420700
C*************************   WRITE SUMMARY TABLE 2   ********************00420800
      HOURS1 = DELTQ * FLOAT(IP) / 3600. + CTIME1                               00420900
```

```
      HOURS2 = DELTQ * FLOAT(LP) / 3600. + CTIME1                          00421000
      KDAYS1 = HOURS1 / 24.                                                00421100
      KDAYS2 = HOURS2 / 24.                                                00421200
      HOURS2 = CTIME                                                       00421300
      HOURS  = 24.0 * FLOAT(KDAYS1)                                        00421400
      HOURS1 = HOURS1 - HOURS                                              00421500
      WRITE (6,600) IP, KDAYS1, HOURS1, LP, KDAYS2, HOURS2                 00421600
      WRITE (6,602)                                                        00421700
      DO 140 J=1,NJ                                                        00421800
        WRITE (6,604)J, (CMIN2(J,K), CMAX2(J,K), CAVG2(J,K), K=1,NUMC)     00421900
  140 CONTINUE                                                             00422000
C*********************   CHECK FOR PLOTTING OF SUMMARY 2   *************00422100
      IF (PLT.EQ.0) GO TO 146                                              00422200
      NP = 2**NMODE - 1                                                    00422300
      DO 145 ISIDE=1,NP                                                    00422400
      NPP = 0                                                              00422500
      DO 144 J=1,NJ                                                        00422600
        IF(RMNODE(J).GT.85.0) GO TO 144                                    00422700
        IF(NMODE.EQ.1) GO TO 2004                                          00422800
        GO TO (2001,2002,2003),ISIDE                                       00422900
2001    CONTINUE                                                           00423000
          IF(J.GT.25.AND.J.LT.58) GO TO 144                                00423100
          IF(J.GT.88.AND.J.LT.120) GO TO 144                               00423200
          GO TO 2004                                                       00423300
2002    CONTINUE                                                           00423400
          IF(J.GT.25.AND.J.LT.58) GO TO 2004                               00423500
          GO TO 144                                                        00423600
2003    CONTINUE                                                           00423700
          IF(J.GT.88.AND.J.LT.120) GO TO 2004                              00423800
          GO TO 144                                                        00423900
2004    CONTINUE                                                           00424000
        NPP = NPP + 1                                                      00424100
        IF (NPP.GT.99) WRITE (6,606)                                       00424200
          DO 142 LPP=1,5                                                   00424300
            FGQXO(1,LPP,NPP) = CMAX2(J,LPP)                                00424400
            FGQXO(2,LPP,NPP) = CAVG2(J,LPP)                                00424500
            FGQXO(3,LPP,NPP) = CMIN2(J,LPP)                                00424600
  142     CONTINUE                                                         00424700
        FGQXA(NPP) = RMNODE(J)                                             00424800
  144 CONTINUE                                                             00424900
      CALL SUMPLT(IP,LP,ISIDE,NPP)                                         00425000
145   CONTINUE                                                             00425100
  146 CONTINUE                                                             00425200
C*************************************************************************00425300
C                              FORMAT STATEMENTS                          00425400
C*************************************************************************00425500
600   FORMAT (1H1///10X,42(1H*),'     WATER QUALITY SUMMARY      ',42(1H*00425600
     *)/ ,10X,'STARTS AT CYCLE ',I4,' (',I3,' DAYS ',F4.1,' HOURS)',31X,00425700
     *'ENDS AT CYCLE ',I4,' (',I3,' DAYS ',F4.1,' HOURS)'///)             00425800
602   FORMAT(1H /4X,'JUNC',9X,'CONSTITUENT 1',10X,'CONSTITUENT 2',10X,'C00425900
     1ONSTITUENT 3',10X,'CONSTITUENT 4',10X,'CONSTITUENT 5 ',            00426000
     2 /15X,'MIN    MAX    AVE      MIN    MAX    AVE      MIN    MAX   00426100
     3 AVE      MIN    MAX    AVE      MIN    MAX    AVE',               00426200
     4           /,4X,124(1H-)/ )                                        00426300
604   FORMAT (4X,I3,4X,5(2X,3F7.2))                                        00426400
606   FORMAT('1  NUMBER OF PLOTTER PTS EXCEEDS ARRAY DIMENSIONS')          00426500
      RETURN                                                               00426600
      END                                                                  00426700
C*************************************************************************00426800
C                                    STATS                                00426900
C*************************************************************************00427000
```

```
      SUBROUTINE STATS (IP, LP, NU)                                          00427100
      COMMON/MANSTA/ NJSTAT,JUNCST(50),ISTAT(5)                              00427200
      COMMON/TRN/C(160,5),Y(160),TRNSC(5),LOGOP(5),DMULT(5),IADOP(5),        00427300
     1           IADDTR(2),IDATRF,IADTRF,MLTTRF,LOGTRF,NUMC                  00427400
      COMMON NSPEC,DELTQ,NUMCON,NALPHA,NJ,KZOP,                              00427500
     1       NTIMES,CTIME1,CTIME,TSRISE,TSSET                                00427600
      COMMON/RNF/RMNODE(160),DUMMY1(595),ICYC,DUMMY2(408)                    00427700
      COMMON/STAORD/  Z(500)                                                 00427800
      DIMENSION  CC(6), CUM(10)                                              00427900
C*************************   WRITE DATA ONTO DISC   ********************00428000
      DO 100 L=1,NJSTAT                                                      00428100
        J = JUNCST(L)                                                        00428200
        IF (IDATRF.EQ.0) GO TO 90                                            00428300
          CALL DATRF(J,NUMCON)                                               00428400
          WRITE(NU) ICYC,(TRNSC(K),K=1,NUMC)                                 00428500
          GO TO 100                                                          00428600
 90     CONTINUE                                                             00428700
          WRITE (NU) ICYC, (C(J,K), K=1,NUMCON)                              00428800
 100  CONTINUE                                                               00428900
      IF (ICYC.LT.LP) RETURN                                                 00429000
C*************************   READ AND ORDER THE DATA   ********************00429100
      NPAGE = 60                                                             00429200
      DO 116 II=1,NUMC                                                       00429300
        IF (ISTAT(II).EQ.0) GO TO 116                                        00429400
        NPAGE = NPAGE + 10 + NJSTAT                                          00429500
        IF (NPAGE.LE.60) GO TO 101                                           00429600
        WRITE (6,604)                                                        00429700
        NPAGE = 10 + NJSTAT                                                  00429800
 101    CONTINUE                                                             00429900
        WRITE (6,600) II, IP, LP                                             00430000
        DO 114 JJ=1,NJSTAT                                                   00430100
          J = JUNCST(JJ)                                                     00430200
          REWIND NU                                                          00430300
          II1 = JJ                                                           00430400
          KK  = 0                                                            00430500
            DO 106 I=IP,LP                                                   00430600
              KK = KK + 1                                                    00430700
                DO 102 L=1,II1                                               00430800
                  READ (NU) ICYC, (CC(K), K=1,NUMC)                          00430900
 102            CONTINUE                                                     00431000
              Z(KK) = CC(II)                                                 00431100
               L2   = NJSTAT - JJ                                            00431200
              IF (L2.EQ.0) GO TO 106                                         00431300
                DO 104 M=1,L2                                                00431400
                  READ (NU) ICYC, (CC(K), K=1,NUMC)                          00431500
 104            CONTINUE                                                     00431600
 106      CONTINUE                                                           00431700
        CALL ORDER (IP, LP)                                                  00431800
C*********************  COMPUTE STATISTICS USING ORDERED DATA  ********00431900
C                                                                            00432000
C       *********************  MIN  MAX  AVG  ***************************00432100
        ND = LP - IP + 1                                                     00432200
        ZAVG = 0.                                                            00432300
          DO 108 N=1,ND                                                      00432400
            ZAVG = ZAVG + Z(N)                                               00432500
 108      CONTINUE                                                           00432600
        ZAVG = ZAVG / FLOAT(ND)                                              00432700
        ZMIN = Z(1)                                                          00432800
C       *********************  PERCENTILES  *****************************00432900
        PROB = FLOAT(ND) / 10.                                               00433000
          DO 110 K=1,10                                                      00433100
```

```
            IDIST  = FLOAT(K) * PROB
            CUM(K) = Z(IDIST)
  110     CONTINUE
C         ******************  SKEWNESS + KURTOSIS  ***********************
          SDIFF2 = 0.
          SDIFF3 = 0.
          SDIFF4 = 0.
            DO 112 N=1,ND
              DIFF   = Z(N) - ZAVG
              SDIFF2 = SDIFF2 + DIFF**2
              SDIFF3 = SDIFF3 + DIFF**3
              SDIFF4 = SDIFF4 + DIFF**4
  112       CONTINUE
          XND  = 1. / FLOAT(ND)
          XNU = FLOAT(ND) - 1.0
          SDEV = SQRT(SDIFF2/XNU)
          SKEW = (XND * SDIFF3) / ((XND * SDIFF2)**1.5)
          CURT = ((XND * SDIFF4) / (((XND * SDIFF2)**2)) -3)
C*******************************  OUTPUT STATISTIC TABLES  *************
          WRITE (6,602) J,ZAVG,SDEV,SKEW,CURT,ZMIN,(CUM(K),K=1,10)
  114   CONTINUE
  116 CONTINUE
      REWIND NU
C*****************************  FORMAT STATEMENTS  ***********************
  600 FORMAT (1H //20X,88(1H*),/,1X,19(1H*),'  STATISTICAL ANALYSIS OF C
     *ONSTITUENT',I2,' CONCENTRATIONS FROM CYCLE',I5,' TO CYCLE',I5,3X,
     *18(1H*),/,20X,88(1H*),//,51X,24(1H*),'  CUMULATIVE PROBABILITIES
     *',24(1H*),/,2X,'JUNC      MEAN     ST DEV    SKEWNESS  KURTOSIS
     *  00      10      20      30      40      50      60      70      80      9
     *0      100',/,1X,128(1H-),/  )
  602 FORMAT (2X,I3,4(1X,F9.2),5X,11F7.2)
  604 FORMAT (1H1)
      RETURN
      END
C*********************************************************************
C                                  ORDER
C*********************************************************************
      SUBROUTINE ORDER (IP, LP)
      COMMON/STAORD/ Z(500)
C*****************************  ORDER THE X/ARRAY  ***********************
      NM = LP - IP
C             ******************  FORWARD PASS  *****************
      DO 104 II=1,NM
        NCHNG = 0
          DO 100 K=1,NM
            IF (Z(K).LE.Z(K+1)) GO TO 100
              TEMP   = Z(K)
              Z(K)   = Z(K+1)
              Z(K+1) = TEMP
              NCHNG  = NCHNG + 1
  100     CONTINUE
        IF (NCHNG.EQ.0) RETURN
C             *****************  BACKWARD PASS  ****************
        NCHNG = 0
        DO 102 N = 1,NM
          K = NM - N + 1
            IF (Z(K).LE.Z(K+1)) GO TO 102
              TEMP   = Z(K)
              Z(K)   = Z(K+1)
              Z(K+1) = TEMP
              NCHNG  = NCHNG + 1
```

```
  102     CONTINUE                                                              00439300
          IF (NCHNG.EQ.0) RETURN                                                00439400
  104 CONTINUE                                                                  00439500
      RETURN                                                                    00439600
      END                                                                       00439700
C*************************************************************************** 00439800
C                              SUMPLT                                         00439900
C*************************************************************************** 00440000
      SUBROUTINE SUMPLT(IP,LP,ISIDE,NPP)                                        00440100
      DIMENSION X(103,6),Y(103,6), NPT(6), BOT1(12), SIDE1(51), SIDE2(6)00440200
      COMMON/TRN/DUMMY(986),NUMC                                                00440300
      COMMON/QLXQXP/ FGQXO(3,6,99),FGQXA(99),KDAYS1,HOURS1,KDAYS2,HOURS200440400
      COMMON/A/GMAX(5),GMIN(5),DUMM1(182)                                       00440500
      COMMON/WNF/DUM1(756),IGCF(5),DUM2(403)                                    00440600
      COMMON NSPEC,DELTQ,NUMCON,NALPHA,NJ,KZOP,                                 00440700
     1       NTIMES,CTIME1,CTIME,TSRISE,TSSET                                   00440800
      COMMON/LABELS/TOP(10),BOTTOM(12),SIDE(51)                                 00440900
      COMMON/AXES/XAXIS,YAXIS,XMIN,XMAX,YMIN,YMAX                               00441000
      DATA BOT1/6*4H     ,4HMILE,4HS BE,4HLOW ,4HTREN,4HTON ,4H     /           00441100
      DATA SIDE1/21*1H ,1HC,1HO,1HN,1HS,1HT,1HI,1HT,1HU,1HE,1HN,1HT,            00441200
     1  19*1H /                                                                 00441300
      DATA SIDE2/1H1,1H2,1H3,1H4,1H5,1H6/                                       00441400
      XMIN=0.1                                                                  00441500
      XMAX=90.0                                                                 00441600
C*****************   SET LABELS ON SIDE AND BOTTOM AXES   ***************00441700
      DO 300 I=1,51                                                             00441800
  300 SIDE(I)=SIDE1(I)                                                          00441900
      DO 301 I=1,12                                                             00442000
  301 BOTTOM(I)=BOT1(I)                                                         00442100
      DO 100 II=1,NUMC                                                          00442200
      IF (IGCF(II).EQ.0) GO TO 100                                              00442300
C*****************   FILL UP X & Y ARRAYS WITH DATA TO BE PLOTTED   ******00442400
      DO 110 I=1,NPP                                                            00442500
      Y(I,1) = FGQXO(1,II,I)                                                    00442600
      Y(I,2) = FGQXO(2,II,I)                                                    00442700
      Y(I,3) = FGQXO(3,II,I)                                                    00442800
      X(I,1) = FGQXA(I)                                                         00442900
      X(I,2) = FGQXA(I)                                                         00443000
      X(I,3) = FGQXA(I)                                                         00443100
  110 CONTINUE                                                                  00443200
      NPT(1) = NPP                                                              00443300
      NPT(2) = NPP                                                              00443400
      NPT(3) = NPP                                                              00443500
C********************   SET SIDE LABELS FOR CONSTITUENT NO.   ************00443600
      SIDE(34)=SIDE2(II)                                                        00443700
C*****************************   WRITE OUT TITLE   ************************00443800
      GO TO (112,114,116),ISIDE                                                 00443900
  112  CONTINUE                                                                 00444000
       WRITE (22,514)                                                           00444100
  514  FORMAT(1H1,34X,'DELAWARE ESTUARY CENTER CHANNEL - QUALITY SUMMAR00444200
     1Y')                                                                       00444300
       GO TO 118                                                                00444400
  114  CONTINUE                                                                 00444500
       WRITE (22,515)                                                           00444600
  515  FORMAT(1H1,34X,'DELAWARE ESTUARY PA-DEL SIDE - QUALITY SUMMARY')00444700
       GO TO 118                                                                00444800
  116  CONTINUE                                                                 00444900
      WRITE(22,516)                                                             00445000
  516 FORMAT(1H1,34X,'DELAWARE ESTUARY NJ SIDE - QUALITY SUMMARY')              00445100
  118 CONTINUE                                                                  00445200
      WRITE (22,517) IP, KDAYS1, HOURS1, LP, KDAYS2, HOURS2                     00445300
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```
  517 FORMAT(1H ,32X,'SUMMARY STARTS AT CYCLE',2I6,' DAYS',F5.1,' HOURS'00445400
     */33X,'SUMMARY  ENDS  AT CYCLE',2I6,' DAYS',F5.1,' HOURS')          00445500
      YMIN=GMIN(II)                                                      00445600
      YMAX=GMAX(II)                                                      00445700
C*************************   CALL CURVE TO PRODUCE THE PLOT   ************00445800
      CALL CURVE(X,Y,NPT,3,1,0,2,0,ISIDE)                                00445900
  100 CONTINUE                                                           00446000
      RETURN                                                             00446100
      END                                                                00446200
      SUBROUTINE SWPLOT                                                  00446300
      COMMON/A/GMAX(5),GMIN(5),NGJUNC(20),NGST(20),NGEND(20),            00446400
     1   NGCON(20,5),NGCYC,NBRCON,NGINT(20)                              00446500
      COMMON/WNF/RMNODE(160),FGSWO(99,5),FGSWA(99),IWFSCY,ICYC,IGCF(5),  00446600
     1 KSLACK,IWF,IWFFCY,INODOR(99),NMODE,NODERM(100,3)                  00446700
      COMMON/B/NDATA,DATA(3,5,16,3),RDATA(16),IMPOSE                     00446800
      COMMON/AXES/XAXIS,YAXIS,XMIN,XMAX,YMIN,YMAX                        00446900
      COMMON/LABELS/TOP(10),BOTTOM(12),SIDE(51)                          00447000
      COMMON/LAB/TITLE(18),XLAB(11),YLAB(6),HORIZ(20),VERT(6)            00447100
      DIMENSION SIDE1(51),SIDE2(5),BOT1(12),TOP1(10)                     00447200
      DIMENSION X(103,6),Y(103,6),NPT(6)                                 00447300
      DATA TOP1/10*4H    /                                               00447400
      DATA BOT1/7*4H    ,4HMILE,4HS BE,4HLOW ,4HTREN,4HTON /             00447500
      DATA SIDE1/21*1H ,1HC,1HO,1HN,1HS,1HT,1HI,1HT,1HU,1HE,1HN,1HT,     00447600
     1  19*1H /                                                          00447700
      DATA SIDE2/1H1,1H2,1H3,1H4,1H5/                                    00447800
      XMIN=0.1                                                           00447900
      XMAX=90.0                                                          00448000
      NPT(1)=IWF                                                         00448100
C                                                                        00448200
C     SET LABELS                                                         00448300
C                                                                        00448400
      DO 300 I=1,51                                                      00448500
  300 SIDE(I)=SIDE1(I)                                                   00448600
      DO 301 I=1,12                                                      00448700
  301 BOTTOM(I)=BOT1(I)                                                  00448800
      DO 302 I=1,10                                                      00448900
  302 TOP(I)=TOP1(I)                                                     00449000
      DO 100 II=1,5                                                      00449100
      IF(IGCF(II).NE.1) GO TO 100                                        00449200
      IF(IMPOSE.LT.4) GO TO 199                                          00449300
      IF(II.LT.5) GO TO 100                                              00449400
199   CONTINUE                                                           00449500
      IMPCHK = II + IMPOSE                                               00449600
C                                                                        00449700
C    FILL UP X AND Y ARRAYS                                              00449800
C                                                                        00449900
C *************  INITIALIZE COUNTERS *****************                 00450000
      IF(IMPOSE.EQ.4) GO TO 304                                          00450100
      IC=0                                                               00450200
      IL=0                                                               00450300
      IR=0                                                               00450400
304   CONTINUE                                                           00450500
      ICP=0                                                              00450600
      ILP=0                                                              00450700
      IRP=0                                                              00450800
      DO 110 I=1,IWF                                                     00450900
      IF(NMODE.EQ.2) GO TO 9000                                          00451000
      IF(IMPOSE.LT.4) GO TO 200                                          00451100
      ICP=ICP+1                                                          00451200
      X(ICP,2) = FGSWA(I)                                                00451300
      Y(ICP,2)=FGSWO(I,5)                                                00451400
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```
      AXA=X1                                                            00488100
      AXB=X2                                                            00488200
      AYA=Y1                                                            00488300
      AYB=Y2                                                            00488400
      N=1                                                               00488500
      IF(ABS(AXB-AXA).LT.ABS(AYB-AYA)) GO TO 290                        00488600
C                                                                       00488700
C                     SET PARAMETERS FOR X DIRECTION                    00488800
C                                                                       00488900
       IF(AXB.GT.AXA) GO TO 245                                         00489000
      AXA=X2                                                            00489100
      AXB=X1                                                            00489200
      AYA=Y2                                                            00489300
      AYB=Y1                                                            00489400
  245 CONTINUE                                                          00489500
      IXA=AXA+0.5                                                       00489600
      IXB=AXB+0.5                                                       00489700
      IYA=AYA+0.5                                                       00489800
      IYB=AYB+0.5                                                       00489900
  250 CONTINUE                                                          00490000
      IF(IXA.LT.0.OR.IXA.GT.JXAX) GO TO 260                             00490100
      IF(IYA.LT.0.OR.IYA.GT.JYAX) GO TO 260                             00490200
      CALL PPLOT(IXA,IYA,NSYM,NCT)                                      00490300
  260 CONTINUE                                                          00490400
      IXA=IXA+1                                                         00490500
      YA=(N*(AYB-AYA))/(AXB-AXA)                                        00490600
      IYA=AYA+YA+0.5                                                    00490700
      N=N+1                                                             00490800
      IF(IXA.LE.IXB) GO TO 250                                          00490900
      GO TO 400                                                         00491000
C                                                                       00491100
C                     SET PARAMETERS FOR Y DIRECTION                    00491200
C                                                                       00491300
  290 CONTINUE                                                          00491400
      IF(AYB.GT.AYA) GO TO 295                                          00491500
      AYB=Y1                                                            00491600
      AYA=Y2                                                            00491700
      AXB=X1                                                            00491800
      AXA=X2                                                            00491900
  295 CONTINUE                                                          00492000
      IXA=AXA+0.5                                                       00492100
      IXB=AXB+0.5                                                       00492200
      IYB=AYB+0.5                                                       00492300
      IYA=AYA+0.5                                                       00492400
  300 CONTINUE                                                          00492500
      IF(IXA.LT.0.OR.IXA.GT.JXAX) GO TO 310                             00492600
      IF(IYA.LT.0.OR.IYA.GT.JYAX) GO TO 310                             00492700
      CALL PPLOT(IXA,IYA,NSYM,NCT)                                      00492800
  310 CONTINUE                                                          00492900
      IYA=IYA+1                                                         00493000
      XA=(N*(AXB-AXA))/(AYB-AYA)                                        00493100
      IXA=XA+AXA+0.5                                                    00493200
      N=N+1                                                             00493300
      IF(IYA-IYB) 300,320,400                                           00493400
  320 IXA=IXB                                                           00493500
      GO TO 300                                                         00493600
  400 RETURN                                                            00493700
      END                                                               00493800
      SUBROUTINE SCALE(ARRAY,AMAX,AMIN,AXLEN,NPTS,INC)                  00493900
      COMMON/AXES/XAXIS,YAXIS,XMIN,XMAX,YMIN,YMAX                       00494000
      DIMENSION INT(5),ARRAY(103,4)                                     00494100
```

```
      DATA INT/2,4,5,8,10/                                              00494200
      INCT=IABS(INC)                                                    00494300
      IF(AMAX-AMIN) 275,255,275                                         00494400
C                                                                       00494500
C                          RESET MAX AND MIN FOR ZERO RANGE             00494600
C                                                                       00494700
  255 IF(AMIN) 265,400,260                                              00494800
  260 AMIN=0.0                                                          00494900
      AMAX=2.0*AMAX                                                     00495000
      GO TO 275                                                         00495100
  265 AMAX=0.0                                                          00495200
      AMIN=2.0*AMIN                                                     00495300
  275 CONTINUE                                                          00495400
C                                                                       00495500
C                          COMPUTE UNITS/INCH                           00495600
C                                                                       00495700
      RATE=(AMAX-AMIN)/AXLEN                                            00495800
C                                                                       00495900
C                         SCALE INTERVAL TO                             00496000
C                          LESS THAN 10                                 00496100
C                                                                       00496200
      A=ALOG10(RATE)                                                    00496300
      N=A                                                               00496400
      IF(A.LT.0) N=A-0.9999                                             00496500
      RATE=RATE/(10.**N)                                                00496600
      L=RATE+1.00                                                       00496700
C                                                                       00496800
C                              FIND NEXT HIGHER INTERVAL                00496900
C                                                                       00497000
  280 DO 300 I=1,5                                                      00497100
      IF(L-INT(I)) 320,320,300                                          00497200
  300 CONTINUE                                                          00497300
C                                                                       00497400
C                          L IS NEXT HIGHER INTERVAL                    00497500
C                          RANGE IS SCALED BACK TO FULL SET             00497600
C                                                                       00497700
  320 L=INT(I)                                                          00497800
      RANGE=FLOAT(L)*10.**N                                             00497900
      IF(INC.LT.0) GO TO 350                                            00498000
C                                                                       00498100
C                          SET UP POSITIVE STEPS                        00498200
C                                                                       00498300
      K=AMIN/RANGE                                                      00498400
      IF(AMIN.LT.0.) K=K-1                                              00498500
C                                                                       00498600
C                          CHECK FOR MAL VALUE IN RANGE                 00498700
C                                                                       00498800
      IF(AMAX.GT.(K+AXLEN)*RANGE) GO TO 330                             00498900
      I=NPTS*INCT+1                                                     00499000
      ARRAY(I,1)=K*RANGE                                                00499100
      I=I+INCT                                                          00499200
      ARRAY(I,1)=RANGE                                                  00499300
      RETURN                                                            00499400
C                                                                       00499500
C                          IF OUTSIDE RANGE RESET L AND N               00499600
C                                                                       00499700
  330 L=L+1                                                             00499800
      IF(L.LT.11) GO TO 280                                             00499900
      L=2                                                               00500000
      N=N+1                                                             00500100
  340 GO TO 280                                                         00500200
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      GO TO 110                                                          00451500
  200 CONTINUE                                                           00451600
      IC = IC + 1                                                        00451700
      X(IC,1) = FGSWA(I)                                                 00451800
      Y(IC,1) = FGSWO(I,II)                                              00451900
      GO TO 110                                                          00452000
 9000 CONTINUE                                                           00452100
      IF(INODOP(I).GT.25.AND.INODOR(I).LT.58)GOTO 901                    00452200
      IF(INODOR(I).GT.88.AND.INODOR(I).LT.120)GOTO 902                   00452300
      IF(IMPOSE.LT.4) GO TO 201                                          00452400
      ICP=ICP+1                                                          00452500
      X(ICP,2) = FGSWA(I)                                                00452600
      Y(ICP,2)=FGSWO(I,5)                                                00452700
      GO TO 903                                                          00452800
  201 CONTINUE                                                           00452900
      IC=IC+1                                                            00453000
      X(IC,1)=FGSWA(I)                                                   00453100
       Y(IC,1)=FGSWO(I,II)                                               00453200
      GOTO 903                                                           00453300
  901 CONTINUE                                                           00453400
      IF(IMPOSE.LT.4) GO TO 202                                          00453500
      ILP=ILP+1                                                          00453600
      X(ILP,4) = FGSWA(I)                                                00453700
      Y(ILP,4)=FGSWO(I,5)                                                00453800
      GO TO 903                                                          00453900
  202 CONTINUE                                                           00454000
      IL=IL+1                                                            00454100
      X(IL,3) = FGSWA(I)                                                 00454200
      Y(IL,3) = FGSWO(I,II)                                              00454300
      GOTO 903                                                           00454400
  902 CONTINUE                                                           00454500
      IF(IMPOSE.LT.4) GO TO 203                                          00454600
      IRP=IRP+1                                                          00454700
      X(IRP,6) = FGSWA(I)                                                00454800
      Y(IRP,6)=FGSWO(I,5)                                                00454900
      GO TO 903                                                          00455000
  203 CONTINUE                                                           00455100
      IR=IR+1                                                            00455200
      X(IR,5) = FGSWA(I)                                                 00455300
      Y(IR,5) = FGSWO(I,II)                                              00455400
  903 CONTINUE                                                           00455500
  110 CONTINUE                                                           00455600
      NPT(1)=IC                                                          00455700
      NPT(2)=ICP                                                         00455800
      NPT(3)=IL                                                          00455900
      NPT(4)=ILP                                                         00456000
      NPT(5)=IR                                                          00456100
      NPT(6)=IRP                                                         00456200
C                                                                        00456300
C   SET SIDE LABELS                                                      00456400
      SIDE(34)=SIDE2(II)                                                 00456500
      IF(IMPCHK.LT.8) GO TO 350                                          00456600
      IF(IMPOSE.EQ.4) GO TO 355                                          00456700
      ISAVE=IWFSCY                                                       00456800
      RETURN                                                             00456900
  355 CONTINUE                                                           00457000
      IWFSCY=ISAVE                                                       00457100
  350 CONTINUE                                                           00457200
C***    LOOP TO PLOT CENTER AND SIDES                                    00457300
      NP = 2**NMODE-1                                                    00457400
      DO 500 N=1,NP                                                      00457500
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      NN=N*2-1                                                          00457600
      IF(NPT(NN).EQ.0) GO TO 500                                        00457700
      IF(N.EQ.1) GO TO 507                                              00457800
      IK=NPT(NN)                                                        00457900
      DO 505 I=1,IK                                                     00458000
      X(I,1)=X(I,NN)                                                    00458100
      Y(I,1)=Y(I,NN)                                                    00458200
      NPT(1) = NPT(NN)                                                  00458300
505   CONTINUE                                                          00458400
507   CONTINUE                                                          00458500
      IF(IMPOSE.LT.4) GO TO 360                                         00458600
      IF(N.EQ.1) GO TO 360                                              00458700
      NNN=N*2                                                           00458800
      IK=NPT(NNN)                                                       00458900
      IF(IK.EQ.0) GO TO 360                                             00459000
      DO 357 I=1,IK                                                     00459100
      X(I,2)=X(I,NNN)                                                   00459200
      Y(I,2)=Y(I,NNN)                                                   00459300
      NPT(2) = NPT(NNN)                                                 00459400
357   CONTINUE                                                          00459500
360   CONTINUE                                                          00459600
C***    WRITE OUT TITLE                                                 00459700
      GO TO (515,520,525),N                                             00459800
515   WRITE(22,516)                                                     00459900
516   FORMAT(1H1,45X,'DELAWARE ESTUARY CENTER CHANNEL')                 00460000
      GO TO 530                                                         00460100
520   WRITE(22,521)                                                     00460200
521   FORMAT(1H1,45X,'DELAWARE ESTUARY PA-DEL SIDE')                    00460300
      GO TO 530                                                         00460400
525   WRITE(22,526)                                                     00460500
526   FORMAT(1H1,45X,'DELAWARE ESTUARY NJ SIDE')                        00460600
530   CONTINUE                                                          00460700
      K=KSLACK+1                                                        00460800
      GOTO (210,230,220,220),K                                          00460900
210   WRITE(22,215)IWFSCY                                               00461000
215   FORMAT(1H0,45X,'PROFILE PLOT FOR CYCLE',I6)                       00461100
      GO TO 240                                                         00461200
220   WRITE(22,225) IWFSCY,IWFFCY                                       00461300
225   FORMAT(1H0,36X,'  LOW WATER SLACK PLOT FROM CYCLE',I5,' TO CYCLE',00461400
     AI5)                                                               00461500
      GO TO 240                                                         00461600
230   WRITE(22,235)IWFSCY,IWFFCY                                        00461700
235   FORMAT(1H0,36X,'HIGH WATER SLACK PLOT FROM CYCLE',I5,' TO CYCLE', 00461800
     1I5)                                                               00461900
  240 CONTINUE                                                          00462000
      YMIN=GMIN(II)                                                     00462100
      YMAX=GMAX(II)                                                     00462200
      ISTAN=II                                                          00462300
      ISIDE = N                                                         00462400
      IF(NDATA.EQ.0) ISTAN=0                                            00462500
C                                                                       00462600
C   CALL CURVE TO PRODUCE THE PLOT                                      00462700
C                                                                       00462800
      IF(IMPOSE.LT.4) GO TO 370                                         00462900
      CALL CURVE(X,Y,NPT,2,1,0,2,ISTAN,ISIDE)                           00463000
      GO TO 500                                                         00463100
370   CONTINUE                                                          00463200
      CALL CURVE(X,Y,NPT,1,1,0,2,ISTAN,ISIDE)                           00463300
  500 CONTINUE                                                          00463400
  100 CONTINUE                                                          00463500
      RETURN                                                            00463600
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      END                                                                00463700
      SUBROUTINE PLOTER                                                  00463800
      COMMON/AXES/XAXIS,YAXIS,XMIN,XMAX,YMIN,YMAX                        00463900
      DIMENSION X(103,6),Y(103,6),NPT(6),C(5)                            00464000
      COMMON/LAB/TITLE(18),XLAB(11),YLAB(6),HORIZ(20),VERT(6)            00464100
      COMMON/LABELS/TOP(10),BOTTOM(12),SIDE(51)                          00464200
      COMMON/A/GMAX(5),GMIN(5),NGJUNC(20),NGST(20),NGEND(20),            00464300
     1   NGCON(20,5),NGCYC,NBRCON,NGINT(20)                              00464400
      DIMENSION SIDE1(51),SIDE2(5),BOT1(12),TOP1(10)                     00464500
      DATA SIDE1/21*1H ,1HC,1HO,1HN,1HS,1HT,1HI,1HT,1HU,1HE,1HN,1HT,     00464600
     1  19*1H /                                                          00464700
      DATA SIDE2/1H1,1H2,1H3,1H4,1H5/                                    00464800
      DATA BOT1/9*4H    ,4HCYCL,4HES  ,4H    /                         00464900
      DATA TOP1/10*4H    /                                             00465000
      NUMCON = NBRCON                                                    00465100
C                                                                        00465200
C     SET LABELS                                                         00465300
C                                                                        00465400
      N11=11                                                             00465500
      IF(NGCYC.EQ.0) RETURN                                              00465600
      DO 300 I=1,51                                                      00465700
  300 SIDE(I)=SIDE1(I)                                                   00465800
      DO 301 I=1,10                                                      00465900
  301 TOP(I)=TOP1(I)                                                     00466000
      DO 302 I=1,12                                                      00466100
  302 BOTTOM(I)=BOT1(I)                                                  00466200
      DO 100 II=1,NGCYC                                                  00466300
      DO 200 JJ=1,5                                                      00466400
      REWIND N11                                                         00466500
      IF(NGCON(II,JJ).NE.1) GO TO 200                                    00466600
      YMIN=GMIN(JJ)                                                      00466700
      YMAX=GMAX(JJ)                                                      00466800
C**********  SKIP TO STARTING CYCLE **********                          00466900
      M=NGST(II)                                                         00467000
      L1=(M-1)*NGCYC                                                     00467100
      IF(L1.EQ.0) GO TO 215                                              00467200
      DO 210 L=1,L1                                                      00467300
  210 READ(N11) ICYC.(C(K),K=1,NUMCON)                                   00467400
  215 CONTINUE                                                           00467500
      II1=II                                                             00467600
      KK=0                                                               00467700
      ITIM1=NGST(II)                                                     00467800
      ITIM2=NGEND(II)                                                    00467900
      ITIM3=NGINT(II)                                                    00468000
C********** LOOP FOR SPECIFIED PLOTTING CYCLES **********               00468100
      DO 280 I=ITIM1,ITIM2,ITIM3                                         00468200
      KK=KK+1                                                            00468300
C********** SKIP TO THEN READ PLOTTING JUNCTION IN PRESENT CYCLE ********00468400
      DO 250 L=1,II1                                                     00468500
  250 READ(N11) ICYC,(C(K),K=1,NUMCON)                                   00468600
      Y(KK,1)=C(JJ)                                                      00468700
      X(KK,1)=I                                                          00468800
      II2=NGCYC*(NGINT(II)-1)                                            00468900
  270 L2=NGCYC-II                                                        00469000
C**********  SKIP TO END OF PRESENT CYCLE ************                  00469100
      IF(L2.EQ.0) GO TO 240                                              00469200
      DO 260 L=1,L2                                                      00469300
  260 READ(N11) ICYC,(C(K),K=1,NUMCON)                                   00469400
  240 CONTINUE                                                           00469500
C********** SKIP TO START OF NEXT PLOTTING CYCLE **********             00469600
      IF(II2.EQ.0) GO TO 280                                             00469700
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      III = I + ITIM3                                                    00469800
      IF(III.GT.ITIM2) GO TO 280                                         00469900
      DO 290 LL=1,II2                                                    00470000
  290 READ(N11) ICYC,(C(K),K=1,NUMCON)                                   00470100
  280 CONTINUE                                                           00470200
C                                                                        00470300
C   SET UP SIDE LABELS                                                   00470400
C                                                                        00470500
  235 SIDE(34)=SIDE2(JJ)                                                 00470600
C                                                                        00470700
C   WRITE OUT TITLE                                                      00470800
C                                                                        00470900
      WRITE(22,400) NGJUNC(II),NGINT(II)                                 00471000
C                                                                        00471100
C   CALL CURVE TO PRODUCE PLOT                                           00471200
C                                                                        00471300
      NPT(1)=KK                                                          00471400
      XMIN=NGST(II)                                                      00471500
      XMAX=NGEND(II)                                                     00471600
      CALL CURVE(X,Y,NPT,1,1,0,2,0,1)                                    00471700
  400 FORMAT(1H1,40X,' TIME PLOTS FOR NODE',I5,' AT AN INTERVAL OF',I5,  00471800
     1   '  CYCLES')                                                     00471900
  200 CONTINUE                                                           00472000
  100 CONTINUE                                                           00472100
      RETURN                                                             00472200
      END                                                                00472300
      SUBROUTINE CURVE(X,Y,NPT,NCV,NPLOT,IJOIN,ITEL,ISTAN,ISIDE)         00472400
      COMMON/B/NDATA,DATA(3,5,16,3),RDATA(16),IMPOSE                     00472500
      COMMON/AXES/XAXIS,YAXIS,XMIN,XMAX,YMIN,YMAX                        00472600
      DIMENSION X(103,6),Y(103,6),NPT(6)                                 00472700
      COMMON/STND/JSTAN,YSTAN,KPLOP                                      00472800
      COMMON/LAB/TITLE(18),XLAB(11),YLAB(6)                              00472900
     1,HORIZ(20),VERT(6)                                                 00473000
C  ******  CURVE IS THE ENTRY TO A GENERALIZED PRINTER PLOT ROUTINE.  TH00473100
C     ROUTINE PLOTS SEQUENTIALLY PAIRED VALUES TAKEN FROM THE X AND     00473200
C      Y ARRAYS.  THE SCALING VALUES FOR BOTH ARRAYS ARE STORED IN THE  00473300
C     LAST TWO ARRAY LOCATIONS IN THE SAME MANNER AS CALCOMP SCALING    00473400
C     THE ARGUMENTS IN THE CALLING SEQUENCE ARE DEFINED BELOW...        00473500
C                                                                       00473600
C          X...THE ARRAY CONTAINING THE X AXIS COORDINATES OF THE       00473700
C          POINTS TO BE PLOTTED.                                        00473800
C                                                                       00473900
C          Y...THE ARRAY CONTAINING THE Y AXIS COORDINATES OF THE       00474000
C              POINTS TO BE PLOTTED                                     00474100
C                                                                       00474200
C          NPT...THE NUMBER OF POINTS TO BE PLOTTED.                    00474300
C                                                                       00474400
C          NCV...THE NUMBER OF CURVES TO BE PLOTTED                     00474500
C                                                                       00474600
C          NPLOT...USED FOR PLOT IDENTIFICATION, THIS VALUE IS          00474700
C               PRINTED ABOVE EACH PLOT FOR EACH CALL TO CURVE.         00474800
C                                                                       00474900
C          IJOIN...FLAG FOR JOINING OR NO JOINING OF DATA POINTS        00475000
C                                                                       00475100
C         ITEL...FLAG FOR GRID SIZE                                     00475200
C                                                                       00475300
C          ISTAN...CONSTITUENT NUMBER                                   00475400
C                                                                       00475500
C          ISIDE...1 = CENTER CHANNEL, 2 = DEL-PA SIDE, 3 = NJ SIDE     00475600
C                                                                       00475700
C                                                                       00475800
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C   SET SPECIAL GRID SIZE IF DESIRED                                    00475900
C                                                                       00476000
      JSTAN=0                                                           00476100
      IF(ITEL-1) 1000,1010,1020                                         00476200
 1010 XAXIS=60.                                                         00476300
      YAXIS=40.                                                         00476400
      GO TO 1000                                                        00476500
 1020 XAXIS=100.                                                        00476600
      YAXIS=50.                                                         00476700
 1000 NPTS=NPT(1)                                                       00476800
C                                                                       00476900
C                                    SET UP X AND Y SCALES              00477000
      IXAX=XAXIS/10.                                                    00477100
      IYAX=YAXIS/10.                                                    00477200
      IXAX1=IXAX+1                                                      00477300
      IYAX1=IYAX+1                                                      00477400
C                                                                       00477500
C                 FIND MAX AND MIN FOR X AND Y ARRAYS                   00477600
C                                                                       00477700
 2001 CONTINUE                                                          00477800
C                                                                       00477900
C          SET UP SCALES                                                00478000
C                                                                       00478100
      AXLEN=IXAX                                                        00478200
      CALL SCALE(X,XMAX,XMIN,AXLEN,NPTS,1)                              00478300
      AXLEN=IYAX                                                        00478400
      CALL SCALE(Y,YMAX,YMIN,AXLEN,NPTS,1)                              00478500
C                                                                       00478600
C                            FORM X LABELS AND FACTORS                  00478700
C                                                                       00478800
      XMIN=X(NPTS+1,1)                                                  00478900
      DELTX=X(NPTS+2,1)                                                 00479000
      XLAB(1)=XMIN                                                      00479100
      DO 260 I=1,IXAX                                                   00479200
  260 XLAB(I+1)=XLAB(I)+DELTX                                           00479300
      XSCAL=XAXIS/(XLAB(IXAX1)-XMIN)                                    00479400
C                                                                       00479500
C                            FORM Y LABELS AND FACTORS                  00479600
C                                                                       00479700
      YMIN=Y(NPTS+1,1)                                                  00479800
      DELTY=Y(NPTS+2,1)                                                 00479900
      YLAB(IYAX1)=YMIN                                                  00480000
      DO 270 I=1,IYAX                                                   00480100
  270 YLAB(IYAX1-I)=YLAB(IYAX1+1-I)+DELTY                               00480200
      YSCAL=YAXIS/(YLAB(1)-YMIN)                                        00480300
C                                                                       00480400
C                            INITIALIZE PLOT OUTLINE                    00480500
C                                                                       00480600
      NCD=100                                                           00480700
      IF(JSTAN.EQ.0) GO TO 2000                                         00480800
      YSTAN=YSCAL*(6.0-YMIN)                                            00480900
 2000 CALL PPLOT(0,0,NCD,NPLOT)                                         00481000
      K=1                                                               00481100
      IF(IJOIN.EQ.0) GO TO 500                                          00481200
C                                                                       00481300
C                               DRAW IN EACH CURVE                      00481400
C                                                                       00481500
      DO 450 L=1,NCV                                                    00481600
      IF(NPT(L).EQ.0) GO TO 440                                         00481700
C                                                                       00481800
C                                JOINING XO YO AND XT YT                00481900
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C                                                                       00482000
      XO=XSCAL*(X(1,L)-XMIN)                                            00482100
      YO=YSCAL*(Y(1,L)-YMIN)                                            00482200
      NPOINT=NPT(L)                                                     00482300
      DO 400 N=2,NPOINT                                                 00482400
      IF(Y(N,L).GT.YMAX) Y(N,L)=YMAX-0.1                                00482500
      IF(Y(N,L).LT.YMIN) Y(N,L)=YMIN+0.1                                00482600
      XT=XSCAL*(X(N,L)-XMIN)                                            00482700
      YT=YSCAL*(Y(N,L)-YMIN)                                            00482800
      IF(XT.LT.XO) GO TO 400                                            00482900
      CALL PINE(XO,YO,XT,YT,K,NPLOT)                                    00483000
      XO=XT                                                             00483100
      YO=YT                                                             00483200
  400 CONTINUE                                                          00483300
  420 CONTINUE                                                          00483400
  440 K=K+1                                                             00483500
  450 CONTINUE                                                          00483600
      GO TO 550                                                         00483700
C                                                                       00483800
C                          PLOT WITHOUT JOINING POINTS                  00483900
C                                                                       00484000
  500 CONTINUE                                                          00484100
      DO 520 L=1,NCV                                                    00484200
      JJ=L                                                              00484300
      NPOINT=NPT(JJ)                                                    00484400
      IF(NPOINT.EQ.0) GO TO 515                                         00484500
      DO 510 N=1,NPOINT                                                 00484600
      XT=XSCAL*(X(N,L)-XMIN)                                            00484700
      YT=YSCAL*(Y(N,L)-YMIN)                                            00484800
      IXT=XT+0.5                                                        00484900
      IXY=YT+0.5                                                        00485000
      CALL PPLOT(IXT,IXY,K,1)                                           00485100
  510 CONTINUE                                                          00485200
  515 K=K+1                                                             00485300
  520 CONTINUE                                                          00485400
C                                                                       00485500
C                            PLOT OBSERVED DATA                         00485600
C                                                                       00485700
550   IF(ISTAN.LT.1) GO TO 565                                          00485800
      DO 560 L=1,3                                                      00485900
      DO 570 N=1,NDATA                                                  00486000
      XT=XSCAL*(PDATA(N)-XMIN)                                          00486100
      YT=YSCAL*(DATA(L,ISTAN,N,ISIDE)-YMIN)                             00486200
      IXT=XT+0.5                                                        00486300
      IXY=YT+0.5                                                        00486400
      L1=L+9                                                            00486500
      CALL PPLOT(IXT,IXY,L1,1)                                          00486600
  570 CONTINUE                                                          00486700
  560 CONTINUE                                                          00486800
565   CONTINUE                                                          00486900
C                                                                       00487000
C                            OUTPUT FINAL PLOT                          00487100
C                                                                       00487200
  555 NC=99                                                             00487300
      CALL PPLOT(0,0,NC,NPLOT)                                          00487400
      RETURN                                                            00487500
      END                                                               00487600
      SUBROUTINE PINE(X1,Y1,X2,Y2,NSYM,NCT)                             00487700
      COMMON/AXES/XAXIS,YAXIS,XMIN,XMAX,YMIN,YMAX                       00487800
      JXAX=XAXIS                                                        00487900
      JYAX=YAXIS                                                        00488000
```

```
C
C                                  SET UP NEGATIVE STEPS
C
  350 K=AMAX/RANGE
      IF(AMAX.GT.0) K=K+1
      IF(AMIN.LT.(K+AXLEN)*RANGE) GO TO 330
      I=INCT*NPTS+1
      ARRAY(I,1)=K*RANGE
      I=I+INCT
      ARRAY(I,1)=-RANGE
      RETURN
  400 WRITE(22,100)
  100 FORMAT(//1H ,10X,'RANGE AND SCALE ARE ZERO ON PLOT ATTEMPT')
      RETURN
      END
      SUBROUTINE PPLOT(IX,IY,K,NCT)
      DIMENSION A(51,101),SYM(14)
      COMMON/AXES/XAXIS,YAXIS,XMIN,XMAX,YMIN,YMAX
      COMMON/LAB/TITLE(18),XLAB(11),YLAB(6)
     1,HORIZ(20),VERT(6)
      COMMON/LABELS/TOP(10),BOTTOM(12),SIDE(51)
      COMMON/STND/JSTAN,YSTAN,KPLOP
      DATA SYM/4H****,4H....,4H0000,4HXXXX,4H++++,4H2222,
     1 4H    ,4HIIII,4H----,4HXXXX,4HAAAA,4H0000,4H&&&&,4H????/
      IXAX1=XAXIS+1.
      IYAX1=YAXIS+1.
      JXAX1=XAXIS/10.+1.
      JYAX1=YAXIS/10.+1.
      IF(K-99) 200,220,230
  200 CONTINUE
C***   CHECK FOR OFF-SCALE VALUES
      IF(IY.GE.IYAX1) GO TO 10
      IF(IY.LT.0) GO TO 20
      A(IYAX1-IY,IX+1) = SYM(K)
      RETURN
   10 CONTINUE
      A(1,IX+1) = SYM(13)
      RETURN
   20 CONTINUE
      A(IYAX1,IX+1) = SYM(14)
      RETURN
  220 CONTINUE
      I=0
C     WRITE(22,300) TOP
C 300 FORMAT(1H1,20X,10A4/1H0)
      DO 225 II=1,JYAX1
      I=I+1
      WRITE(22,310) SIDE(I),YLAB(II),(A(I,J),J=1,IXAX1)
  310 FORMAT(1H ,A1,F7.1,101A1)
      IF(II.EQ.JYAX1) GO TO 228
      DO 224 JJ=1,9
      I=I+1
      IF(I.GT.50) GO TO 500
  223 WRITE(22,320) SIDE(I),(A(I,J),J=1,IXAX1)
  320 FORMAT(1H ,A1,7X,101A1)
      GO TO 224
  500 WRITE(22,510) (A(I,J),J=1,IXAX1)
  510 FORMAT(1H ,8X,101A1)
  224 CONTINUE
  225 CONTINUE
  228 CONTINUE
```

```
      WRITE(22,102) (XLAB(I),I=1,JXAX1)                                 00506400
      WRITE(22,330) BOTTOM                                              00506500
  330 FORMAT(/1H ,20X,12A4)                                             00506600
  102 FORMAT(1H ,11F10.1)                                               00506700
      RETURN                                                            00506800
  230 IYAX=YAXIS                                                        00506900
      DO 250 I=1,IYAX                                                   00507000
      DO 240 J=1,IXAX1                                                  00507100
  240 A(I,J)=SYM(7)                                                     00507200
      A(I,1)=SYM(8)                                                     00507300
  250 CONTINUE                                                          00507400
      DO 260 J=1,IXAX1                                                  00507500
  260 A(IYAX1,J)=SYM(9)                                                 00507600
      DO 270 I=1,IXAX1,10                                               00507700
  270 A(IYAX1,I)=SYM(8)                                                 00507800
      IYJ=IYAX1-10                                                      00507900
      DO 290 I=11,IYJ,10                                                00508000
      A(I,1)=SYM(9)                                                     00508100
  290 CONTINUE                                                          00508200
      IF(JSTAN.EQ.0) GO TO 1000                                         00508300
      IY=YSTAN                                                          00508400
      DO 1000 J=2,IXAX1                                                 00508500
      A(IYAX1-IY,J)=SYM(9)                                              00508600
 1000 CONTINUE                                                          00508700
      IF(KPLOP.EQ.0) RETURN                                             00508800
C*********************   FILL IN BACKGROUND GRID ON PLOTS   **********00508900
      GO TO (1,2,3), KPLOP                                              00509000
C*****************   BACKGROUND OPTION 1 - HIGH DENSITY   **************00509100
C***************   VERTICAL   ***************                           00509200
    1 DO 2000  I=11,IXAX1,10                                            00509300
      DO 1900  J=1,IYAX                                                 00509400
      A(J,I) = SYM(5)                                                   00509500
 1900 CONTINUE                                                          00509600
 2000 CONTINUE                                                          00509700
C***************   HORIZONTAL   *************                           00509800
      IYJ = IYAX1 - 5                                                   00509900
      DO 2200  J=1,IYJ,5                                                00510000
      DO 2100  I=3,IXAX1,2                                              00510100
      A(J,I) = SYM(5)                                                   00510200
 2100 CONTINUE                                                          00510300
 2200 CONTINUE                                                          00510400
      RETURN                                                            00510500
C*****************   BACKGROUND OPTION 2 - MEDIUM DENSITY   *************00510600
C***************   VERTICAL     *************                           00510700
    2 DO 2300  I=21,IXAX1,20                                            00510800
      DO 2400  J=1,IYAX                                                 00510900
      A(J,I) = SYM(5)                                                   00511000
 2400 CONTINUE                                                          00511100
 2300 CONTINUE                                                          00511200
C***************   HORIZONTAL   *************                           00511300
      IYJ = IYAX1 - 5                                                   00511400
      DO 2500  J=1,IYJ,10                                               00511500
      DO 2600  I=3,IXAX1,2                                              00511600
      A(J,I) = SYM(5)                                                   00511700
 2600 CONTINUE                                                          00511800
 2500 CONTINUE                                                          00511900
      RETURN                                                            00512000
C*****************   BACKGROUND OPTION 3 - LOW DENSITY   ****************00512100
    3 DO 2700  I=11,IXAX1,10                                            00512200
      DO 2800  J=1,IYAX,5                                               00512300
      A(J,I) = SYM(5)                                                   00512400
```

```
 2800 CONTINUE                                                  00512500
 2700 CONTINUE                                                  00512600
      RETURN                                                    00512700
      END                                                       00512800
```

A.4 SALINITY - TEST CASE OUTPUT LISTING

```
*
*****************************************************************************************************************************

                    SECTION 2.1              SET PROGRAM CONTROL OPTIONS

*
*****************************************************************************************************************************


DELAWARE ESTUARY (INCLUDING C&D CANAL) HYDRAULIC MODEL ** (76 JUNCTIONS)                    ENVIRONMENTAL PROTECTION AGENCY
DELAWARE FLOW = 12300 CFS , SCHUYLKILL  = 1500 CFS  FILE CN.EPAJYF.SW02.H12300              DYNAMIC WATER QUALITY MODEL
DELAWARE ESTUARY 1-D NETWORK, TRENTON-LISTON POINT. DELAWARE R FLOW = 12,300FCFS
                 SIMULATION PERIOD : MAY 7 - MAY 22, 1968


                              THIS SIMULATION BEGINS AT  0.0  HOURS
                       SUNRISE AND SUNSET OCCUR AT  6.00 AND 18.00 HOURS,RESPECTIVELY


                              ******** FROM HYDRAULICS PROGRAM ********
                              START CYCLE   STOP CYCLE    TIME INTERVAL

                                  150          300        300.  SECONDS


STARTING CYCLE  INITIAL QUALITY  TOTAL QUALITY  DEPLETION CORRECT TIME INTERVAL IN  START OF  START OF  DURATION  END OF
ON HYD EXT TAPE      CYCLE          CYCLES          OPTION        QUALITY PROGRAM    FLOOD      EBB     OF FLOOD   EBB

     168               1             725             3            0.500 HOURS        18         4        11       17
```

RIVER MILES FOR MODEL NETWORK

NODE	RM	NODE	RM	NODE	RM	NODE	RM	NODE	RM	NODE	RM
1	94.0	14	86.0	27	96.0	40	86.0	53	31.0	66	15.2
2	84.8	15	87.0	28	97.0	41	45.0	54	91.0	67	14.0
3	93.0	16	88.0	29	98.0	42	46.8	55	29.8	68	13.1
4	92.0	17	89.0	30	99.0	43	44.4	56	28.0	69	11.2
5	91.0	18	74.0	31	61.6	44	41.5	57	92.0	70	8.9
6	90.0	19	75.0	32	58.7	45	87.0	58	26.0	71	6.5
7	89.0	20	73.2	33	56.5	46	88.0	59	24.3	72	4.8
8	88.0	21	72.0	34	53.8	47	89.0	60	22.3	73	94.0
9	87.0	22	70.8	35	53.0	48	39.2	61	93.0	74	3.2
10	86.0	23	68.3	36	51.6	49	36.7	62	20.6	75	1.8
11	81.9	24	65.7	37	50.0	50	90.0	63	18.8	76	0.5
12	78.9	25	63.5	38	49.0	51	34.4	64	17.0		
13	76.0	26	95.0	39	48.0	52	32.2	65	90.0		

DATA IS TRANSFORMED FOR OUTPUT AS FOLLOWS

SEQUENCE	TRANSFORMATION OPERATION	TRANSFORMED CONSTITUENTS			TRANSF. FACTORS FOR OLD CONSTITUENTS CONST1	CONST2	CONST3	CONST4	CONST5
1	ADDITION	5	AND	0	1	0	0	0	0

THE FOLLOWING 8 JUNCTIONS HAVE TIME PLOTS

JUNCTION	STARTING CYCLE	ENDING CYCLE	CYCLE INTERVAL (1=PLOT 0=NO PLOT)	CON1	CON2	CON3	CON4	CON5
12	1	725	25	1	0	0	0	0
12	250	725	1	1	0	0	0	0
20	1	725	25	1	0	0	0	0
20	250	725	1	1	0	0	0	0
25	1	725	25	1	0	0	0	0
25	250	725	1	1	0	0	0	0
32	1	725	25	1	0	0	0	0
32	250	725	1	1	0	0	0	0

SECTION 2.2 DEFINE WATER QUALITY CONSTITUENTS

THIS RUN CONSIDERS 1 CONSTITUENTS

CONSTITUENT 1 IS CHLORIDES (MG/L)

***** TABLE OF TRANSFER COEFFICIENTS AND FUNCTION OPERATORS *****

CNST(K)	CO(1,K)	CO(2,K)	CO(3,K)	CO(4,K)	CO(5,K)	FUNC1	FUNC2	FUNC3	FUNC4	FUNC5	FUNC6	FUNC7	FUNC8	FUNC9	FUNC10	FUNC11	FUNC12
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

THE TEMPERATURE FROM CYCLE 1 THROUGH CYCLE 2400 IS 20.0 DEGREES C

TABLE OF DECAY RATES (AT 20. C)

SIMULATION PERIOD : MAY 7 - MAY 22, 1968

CONSTITUENT 1 IS CHLORIDES (MG/L)

NODE	******** PRIMARY DECAY RATES 1/DAY (BASE E) ******** CONST1	CONST2	CONST3	CONST4	CONST5	SECONDARY DECAY 1/DAY CONST6	CONST6
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31	0.0	0.0	0.0	0.0	0.0	0.0	0.0
32	0.0	0.0	0.0	0.0	0.0	0.0	0.0
33	0.0	0.0	0.0	0.0	0.0	0.0	0.0
34	0.0	0.0	0.0	0.0	0.0	0.0	0.0
35	0.0	0.0	0.0	0.0	0.0	0.0	0.0
36	0.0	0.0	0.0	0.0	0.0	0.0	0.0
37	0.0	0.0	0.0	0.0	0.0	0.0	0.0
38	0.0	0.0	0.0	0.0	0.0	0.0	0.0
39	0.0	0.0	0.0	0.0	0.0	0.0	0.0
40	0.0	0.0	0.0	0.0	0.0	0.0	0.0
41	0.0	0.0	0.0	0.0	0.0	0.0	0.0
42	0.0	0.0	0.0	0.0	0.0	0.0	0.0

43	0.0	0.0	0.0	0.0	0.0	0.0	0.0
44	0.0	0.0	0.0	0.0	0.0	0.0	0.0
45	0.0	0.0	0.0	0.0	0.0	0.0	0.0
46	0.0	0.0	0.0	0.0	0.0	0.0	0.0
47	0.0	0.0	0.0	0.0	0.0	0.0	0.0
48	0.0	0.0	0.0	0.0	0.0	0.0	0.0
49	0.0	0.0	0.0	0.0	0.0	0.0	0.0
50	0.0	0.0	0.0	0.0	0.0	0.0	0.0
51	0.0	0.0	0.0	0.0	0.0	0.0	0.0
52	0.0	0.0	0.0	0.0	0.0	0.0	0.0
53	0.0	0.0	0.0	0.0	0.0	0.0	0.0
54	0.0	0.0	0.0	0.0	0.0	0.0	0.0
55	0.0	0.0	0.0	0.0	0.0	0.0	0.0
56	0.0	0.0	0.0	0.0	0.0	0.0	0.0
57	0.0	0.0	0.0	0.0	0.0	0.0	0.0
58	0.0	0.0	0.0	0.0	0.0	0.0	0.0
59	0.0	0.0	0.0	0.0	0.0	0.0	0.0
60	0.0	0.0	0.0	0.0	0.0	0.0	0.0
61	0.0	0.0	0.0	0.0	0.0	0.0	0.0
62	0.0	0.0	0.0	0.0	0.0	0.0	0.0
63	0.0	0.0	0.0	0.0	0.0	0.0	0.0
64	0.0	0.0	0.0	0.0	0.0	0.0	0.0
65	0.0	0.0	0.0	0.0	0.0	0.0	0.0
66	0.0	0.0	0.0	0.0	0.0	0.0	0.0
67	0.0	0.0	0.0	0.0	0.0	0.0	0.0
68	0.0	0.0	0.0	0.0	0.0	0.0	0.0
69	0.0	0.0	0.0	0.0	0.0	0.0	0.0
70	0.0	0.0	0.0	0.0	0.0	0.0	0.0
71	0.0	0.0	0.0	0.0	0.0	0.0	0.0
72	0.0	0.0	0.0	0.0	0.0	0.0	0.0
73	0.0	0.0	0.0	0.0	0.0	0.0	0.0
74	0.0	0.0	0.0	0.0	0.0	0.0	0.0
75	0.0	0.0	0.0	0.0	0.0	0.0	0.0
76	0.0	0.0	0.0	0.0	0.0	0.0	0.0

TEMPERATURE CORRECTION FACTORS , THETA

0.0	1.000	1.000	1.000	1.000	1.000	1.000

SECTION 2.3 SPECIFY WASTEWATER AND TRIBUTARY LOADS

SUMMARY OF POINT SOURCE INPUTS

SIMULATION PERIOD : MAY 7 - MAY 22, 1968

CONSTITUENT 1 IS CHLORIDES (MG/L)

MUNICIPAL AND INDUSTRIAL WASTEWATER AND TRIBUTARY INFLOW BY NODE

INPUT NODE	NAME OF DISCHARGE	TYPE OF DISCHARGE	******* FLOW ******* MGD	CFS	UNADJUSTED CONC (MG/L) + ADJ. FACTORS CONST1	CONST2	CONST3	CONST4	CONST5	ADJUSTED INPUT LOADS - 1000 LB/DAY CONST1	CONST2	CONST3	CONST4	CONST5
17	SALEM	TRIB	-9.68		15.00	0.0	0.0	0.0	0.0					
				-15.00	1.00	0.0	0.0	0.0	0.0	1.21	0.0	0.0	0.0	0.0
	NODE TOTAL			-15.00						1.21	0.0	0.0	0.0	0.0
29	CHRISTNA	TRIB	-129.03		15.00	0.0	0.0	0.0	0.0					
				-200.00	1.00	0.0	0.0	0.0	0.0	16.15	0.0	0.0	0.0	0.0
	NODE TOTAL			-200.00						16.15	0.0	0.0	0.0	0.0
30	BRANDYWN	TRIB	-258.06		15.00	0.0	0.0	0.0	0.0					
				-400.00	1.00	0.0	0.0	0.0	0.0	32.31	0.0	0.0	0.0	0.0
	NODE TOTAL			-400.00						32.31	0.0	0.0	0.0	0.0
34	MARCUSHK	TRIB	-31.61		15.00	0.0	0.0	0.0	0.0					
				-49.00	1.00	0.0	0.0	0.0	0.0	3.96	0.0	0.0	0.0	0.0
	NODE TOTAL			-49.00						3.96	0.0	0.0	0.0	0.0
36	CHESTER	TRIB	-53.55		15.00	0.0	0.0	0.0	0.0					
				-83.00	1.00	0.0	0.0	0.0	0.0	6.70	0.0	0.0	0.0	0.0
	NODE TOTAL			-83.00						6.70	0.0	0.0	0.0	0.0

40	OAKBY	TRIB	-38.71		15.00	0.0	0.0	0.0	0.0							
				-60.00	1.00	0.0	0.0	0.0	0.0	4.85	0.0	0.0	0.0	0.0
	NODE TOTAL			-60.00						4.85	0.0	0.0	0.0	0.0
43	MANTUA	TRIB	-15.48		15.00	0.0	0.0	0.0	0.0							
				-24.00	1.00	0.0	0.0	0.0	0.0	1.94	0.0	0.0	0.0	0.0
	NODE TOTAL			-24.00						1.94	0.0	0.0	0.0	0.0
47	SCHULKIL	TRIB	-967.74		5.00	0.0	0.0	0.0	0.0							
				-1500.00	1.00	0.0	0.0	0.0	0.0	40.39	0.0	0.0	0.0	0.0
	NODE TOTAL			-1500.00						40.39	0.0	0.0	0.0	0.0
54	COOPER	TRIB	-20.65		15.00	0.0	0.0	0.0	0.0							
				-32.00	1.00	0.0	0.0	0.0	0.0	2.58	0.0	0.0	0.0	0.0
	NODE TOTAL			-32.00						2.58	0.0	0.0	0.0	0.0
55	PHILA NE	MUN	-164.52		50.00	0.0	0.0	0.0	0.0							
				-255.00	1.00	0.0	0.0	0.0	0.0	68.66	0.0	0.0	0.0	0.0
	NODE TOTAL			-255.00						68.66	0.0	0.0	0.0	0.0
57	PENSAUKN	TRIB	-9.03		15.00	0.0	0.0	0.0	0.0							
				-14.00	1.00	0.0	0.0	0.0	0.0	1.13	0.0	0.0	0.0	0.0
	NODE TOTAL			-14.00						1.13	0.0	0.0	0.0	0.0
61	RANCOCAS	TRIB	-112.90		15.00	0.0	0.0	0.0	0.0							
				-175.00	1.00	0.0	0.0	0.0	0.0	14.14	0.0	0.0	0.0	0.0
	NODE TOTAL			-175.00						14.14	0.0	0.0	0.0	0.0
65	NESHAMNY	TRIB	-103.23		15.00	0.0	0.0	0.0	0.0							
				-160.00	1.00	0.0	0.0	0.0	0.0	12.92	0.0	0.0	0.0	0.0
	NODE TOTAL			-160.00						12.92	0.0	0.0	0.0	0.0
73	CROSWICK	TRIB	-41.29		15.00	0.0	0.0	0.0	0.0							
				-64.00	1.00	0.0	0.0	0.0	0.0	5.17	0.0	0.0	0.0	0.0
	NODE TOTAL			-64.00						5.17	0.0	0.0	0.0	0.0

SUMMARY OF DISCHARGE LOADS BY ZONE AND TYPE

	INPUT ZONE	TYPE OF DISCHARGE	NUMBER OF DISCHARGES	ADJUSTED INPUT LOADS - 1000 LB/DAY CONST1	CONST2	CONST3	CONST4	CONST5	INPUT LOADS - PERCENT OF ZONE BY TYPE CONST1	CONST2	CONST3	CONST4	CONST5
	1	MUN	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1	IND	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1	THIN	1	993.53	0.0	0.0	0.0	0.0	100.00	0.0	0.0	0.0	0.0
-		ZONE TOTAL	1	993.53	0.0	0.0	0.0	0.0	82.41	0.0	0.0	0.0	0.0
	2	MUN	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	IND	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	THIN	1	32.23	0.0	0.0	0.0	0.0	100.00	0.0	0.0	0.0	0.0
-		ZONE TOTAL	1	32.23	0.0	0.0	0.0	0.0	2.67	0.0	0.0	0.0	0.0
	3	MUN	1	68.66	0.0	0.0	0.0	0.0	94.87	0.0	0.0	0.0	0.0
	3	IND	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	3	THIN	2	3.72	0.0	0.0	0.0	0.0	5.13	0.0	0.0	0.0	0.0
0		ZONE TOTAL	3	72.37	0.0	0.0	0.0	0.0	6.00	0.0	0.0	0.0	0.0
	4	MUN	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	4	IND	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	4	THIN	5	57.83	0.0	0.0	0.0	0.0	100.00	0.0	0.0	0.0	0.0
-		ZONE TOTAL	5	57.83	0.0	0.0	0.0	0.0	4.80	0.0	0.0	0.0	0.0
	5	MUN	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	5	IND	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	5	THIN	1	49.68	0.0	0.0	0.0	0.0	100.00	0.0	0.0	0.0	0.0
-		ZONE TOTAL	1	49.68	0.0	0.0	0.0	0.0	4.12	0.0	0.0	0.0	0.0
-		GRAND TOTAL	15	1205.65	0.0	0.0	0.0	0.0					

SECTION 2.4 SPECIFY WATER QUALITY BOUNDARY CONDITIONS

SEAWARD BOUNDARY CONDITIONS

NODE 1 : COURTHOUSE PT , MARYLAND

' CIN1 ' PERIOD = 2400 CYCLES

START CYCLE	DURATION (CYCLES)	CONST1 (MG/L)	CONST2 (MG/L)	CONST3 (MG/L)	CONST4 (MG/L)	CONST5 (MG/L)
1	2400	100.00				

NODE 2 : LISTON PT , DELAWARE

' CINMAX ' PERIOD = 700 CYCLES

START CYCLE	DURATION (CYCLES)	CONST1 (MG/L)	CONST2 (MG/L)	CONST3 (MG/L)	CONST4 (MG/L)	CONST5 (MG/L)
1	50	4500.00				
51	50	4435.00				
101	50	4370.00				
151	50	4305.00				
201	50	4240.00				
251	50	4175.00				
301	50	4110.00				
351	50	4045.00				
401	50	3980.00				
451	50	3915.00				
501	50	3850.00				
551	50	3785.00				
601	50	3720.00				
651	50	3655.00				

UPSTREAM BOUNDARY CONDITIONS

NODE 76 RECIEVES VARYING LOADS FROM DELAWARE (RIVR)

DISCHARGE PERIOD = 2400 CYCLES

START CYCLE	DURATION (CYCLES)	FLOW (CFS)	CONST1 (MG/L)	CONST2 (MG/L)	CONST3 (MG/L)	CONST4 (MG/L)	CONST5 (MG/L)

2400 -12300.00 15.00

SECTION 2.5 PRINT HYDRAULIC INPUTS

JUNCTION HEAD AND HYD. RADIUS AND X-SECTIONAL AREA OF CHANNELS ARE AT MEAN TIDE **

CHAN.	LENGTH	WIDTH	AREA	MANNING	NET FLOW	HYD. RADIUS	JUNC. AT ENDS		JUNC.	INFLOW	HEAD	CHANNELS ENTERING JUNCTION				
1	7000.	2400.	31045.	0.010	-1375.18	12.9	1	3	1	0.0	0.10	1	0	0	0	0
2	11000.	850.	24482.	0.010	-1375.16	28.8	3	4	2	0.0	-0.00	9	0	0	0	0
3	11000.	650.	18651.	0.010	-1375.16	28.7	4	5	3	0.0	0.10	1	2	0	0	0
4	11000.	600.	17100.	0.010	-1375.16	28.5	5	6	4	0.0	0.11	2	3	0	0	0
5	11000.	600.	16927.	0.010	-1375.12	28.2	6	7	5	0.0	0.11	3	4	0	0	0
6	11000.	600.	13781.	0.010	-1375.13	23.0	7	8	6	0.0	0.12	4	5	0	0	0
7	11000.	600.	12403.	0.010	-1375.13	20.7	8	9	7	0.0	0.12	5	6	0	0	0
8	15679.	600.	11070.	0.010	-1375.11	18.4	9	10	8	0.0	0.13	6	7	0	0	0
9	14994.	12995.	213604.	0.010	-13974.20	16.4	2	11	9	0.0	0.14	7	8	0	0	0
10	14994.	11829.	183788.	0.010	-13974.73	15.5	11	12	10	0.0	0.15	8	12	0	0	0
11	14994.	7700.	119734.	0.010	-17121.66	15.5	12	13	11	0.0	0.03	9	10	0	0	0
12	11995.	4500.	78422.	0.010	-1375.08	17.4	10	13	12	0.0	0.08	10	11	13	0	0
13	19326.	1700.	12067.	0.010	3146.36	7.1	12	14	13	0.0	0.16	11	12	14	18	20
14	7330.	7600.	69388.	0.010	1546.13	9.1	13	14	14	0.0	0.16	13	14	15	19	0
15	8996.	1000.	8681.	0.015	-17.18	8.7	14	15	15	0.0	0.24	15	16	0	0	0
16	8996.	4332.	32966.	0.015	-16.83	7.6	15	16	16	0.0	0.24	16	17	0	0	0
17	8996.	5331.	40684.	0.015	-15.94	7.6	16	17	17	-15.0	0.24	17	0	0	0	0
18	13661.	3800.	54035.	0.010	5430.77	14.2	13	18	18	0.0	0.18	18	21	0	0	0
19	8996.	5600.	24208.	0.010	8709.76	4.3	14	19	19	0.0	0.21	19	22	0	0	0
20	13661.	3400.	70618.	0.010	-29475.28	20.8	13	20	20	0.0	0.21	20	22	24	0	0
21	10662.	6000.	46240.	0.010	5430.77	7.7	18	21	21	0.0	0.27	21	23	0	0	0
22	9663.	4900.	48337.	0.010	8709.71	9.9	19	20	22	0.0	0.28	23	24	25	0	0
23	10996.	7600.	98843.	0.010	5430.89	13.0	21	22	23	0.0	0.30	25	26	0	0	0
24	13994.	3900.	67147.	0.010	-20765.43	17.2	20	22	24	0.0	0.32	26	27	0	0	0
25	13661.	8996.	150471.	0.010	-15334.46	16.7	22	23	25	0.0	0.33	27	28	33	0	0
26	11995.	8274.	147321.	0.010	-15334.30	17.8	23	24	26	0.0	0.34	28	29	32	0	0
27	11995.	6942.	146240.	0.010	-15334.14	21.1	24	25	27	0.0	0.34	29	30	0	0	0
28	9330.	1000.	14403.	0.015	-599.97	14.4	25	26	28	0.0	0.33	30	31	0	0	0
29	9330.	722.	7556.	0.015	-199.96	10.5	26	27	29	-200.0	0.32	31	0	0	0	0
30	9330.	389.	3621.	0.015	-199.95	9.3	27	28	30	-400.0	0.35	32	0	0	0	0
31	9330.	278.	2307.	0.015	-199.96	8.3	28	29	31	0.0	0.36	33	34	0	0	0
32	9330.	389.	2265.	0.015	-399.99	5.8	26	30	32	0.0	0.39	34	35	0	0	0
33	11995.	8163.	148744.	0.016	-14733.96	18.2	25	31	33	0.0	0.43	35	36	0	0	0
34	11995.	7441.	128791.	0.016	-14733.75	17.3	31	32	34	-49.0	0.46	36	37	38	0	0
35	11995.	6997.	114879.	0.016	-14733.42	16.4	32	33	35	0.0	0.46	38	40	0	0	0
36	13328.	5720.	115411.	0.016	-14732.96	20.2	33	34	36	-83.0	0.49	37	39	0	0	0
37	11995.	4054.	91310.	0.020	-15122.54	22.5	34	36	37	0.0	0.51	40	41	0	0	0
38	10662.	3887.	64203.	0.020	438.96	16.5	34	35	38	0.0	0.52	39	41	42	43	0
39	11995.	4332.	86368.	0.020	-15039.21	19.9	36	38	39	0.0	0.53	42	44	45	0	0
40	7330.	2443.	15901.	0.020	439.12	6.5	35	37	40	-60.0	0.50	44	0	0	0	0
41	7330.	2100.	18660.	0.020	439.25	8.9	37	38	41	0.0	0.57	45	46	0	0	0
42	6331.	2600.	30224.	0.020	-515.96	11.6	38	39	42	0.0	0.55	43	47	0	0	0
43	11995.	4942.	92943.	0.020	-14083.41	18.8	38	42	43	-24.0	0.58	46	47	48	0	0
44	8996.	300.	1826.	0.020	-60.08	6.1	39	40	44	0.0	0.60	48	49	52	0	0
45	6331.	1944.	13576.	0.020	-455.68	7.0	39	41	45	0.0	0.61	49	50	0	0	0
46	11995.	2388.	29024.	0.020	-455.43	12.2	41	43	46	0.0	0.61	50	51	0	0	0
47	11995.	3499.	78280.	0.020	-14082.92	22.4	42	43	47	-1500.0	0.62	51	0	0	0	0

48	14994.	3998.	90084.	0.020	-14513.54	22.5	43	44
49	10662.	750.	9300.	0.020	-1500.23	12.4	44	45
50	10662.	611.	10275.	0.020	-1500.12	16.8	45	46
51	10662.	555.	7398.	0.020	-1500.02	13.3	46	47
52	11995.	3887.	86529.	0.020	-13012.20	22.3	44	48
53	11995.	2832.	66325.	0.020	-13011.45	23.4	48	49
54	8996.	167.	2138.	0.020	-0.07	12.8	49	50
55	11995.	2332.	65925.	0.020	-13010.68	28.3	49	51
56	10329.	2888.	76558.	0.020	-13010.01	26.5	51	52
57	6331.	1400.	19255.	0.020	-1667.30	13.8	52	53
58	8996.	300.	2128.	0.020	-32.10	7.1	53	54
59	11995.	3165.	74399.	0.020	-11342.12	23.5	52	55
60	7997.	2499.	30885.	0.020	-1635.01	12.4	53	55
61	9674.	3195.	66206.	0.020	-12721.38	20.7	55	56
62	9007.	300.	3492.	0.020	-14.05	11.6	56	57
63	9674.	2474.	53236.	0.035	-12706.62	21.5	56	58
64	9674.	2752.	58812.	0.035	-12705.92	21.4	58	59
65	9674.	2419.	47744.	0.035	-12705.12	19.7	59	60
66	9007.	600.	8372.	0.035	-175.24	14.0	60	61
67	9007.	2863.	49778.	0.035	-12529.10	17.4	60	62
68	9007.	2391.	44823.	0.035	-12528.40	18.7	62	63
69	9508.	1890.	39383.	0.035	-12527.84	20.8	63	64
70	6331.	334.	4708.	0.035	-160.10	14.1	64	65
71	9508.	1640.	38253.	0.035	-12367.12	23.3	64	66
72	11009.	1307.	31764.	0.035	-9796.20	24.3	66	68
73	7839.	862.	14554.	0.040	-2570.35	16.9	66	67
74	7839.	834.	14226.	0.040	-2570.20	17.1	67	68
75	9674.	1362.	32004.	0.040	-12365.86	23.5	68	69
76	10842.	1334.	32893.	0.040	-12365.42	24.7	69	70
77	12009.	1418.	29928.	0.040	-12364.96	21.1	70	71
78	9007.	1362.	23339.	0.040	-12364.51	17.1	71	72
79	6005.	334.	3958.	0.040	-64.04	11.8	72	73
80	7506.	1473.	22122.	0.040	-12300.18	15.0	72	74
81	8000.	1168.	17471.	0.040	-12299.94	15.0	74	75
82	8000.	862.	10123.	0.040	-12299.79	11.7	75	76

48	0.0	0.62	52	53	0	0	0
49	0.0	0.64	53	54	55	0	0
50	0.0	0.64	54	0	0	0	0
51	0.0	0.65	55	56	0	0	0
52	0.0	0.66	56	57	59	0	0
53	0.0	0.67	57	58	60	0	0
54	-32.0	0.66	58	0	0	0	0
55	-255.0	0.67	59	60	61	0	0
56	0.0	0.69	61	62	63	0	0
57	-14.0	0.69	62	0	0	0	0
58	0.0	0.74	63	64	0	0	0
59	0.0	0.77	64	65	0	0	0
60	0.0	0.82	65	66	67	0	0
61	-175.0	0.82	66	0	0	0	0
62	0.0	0.87	67	68	0	0	0
63	0.0	0.91	68	69	0	0	0
64	0.0	0.95	69	70	71	0	0
65	-160.0	0.95	70	0	0	0	0
66	0.0	0.98	71	72	73	0	0
67	0.0	1.00	73	74	0	0	0
68	0.0	1.01	72	74	75	0	0
69	0.0	1.06	75	76	0	0	0
70	0.0	1.11	76	77	0	0	0
71	0.0	1.17	77	78	0	0	0
72	0.0	1.25	78	79	80	0	0
73	-64.0	1.25	79	0	0	0	0
74	0.0	1.33	80	81	0	0	0
75	0.0	1.42	81	82	0	0	0
76	-12300.0	1.83	82	0	0	0	0

SECTION 2.6 SPECIFY INITIAL WATER QUALITY CONDITIONS

WATER QUALITY DATA

JUNC.	INFLOW	FIRST CONSTITUENT INITIAL CONC.	FIRST CONSTITUENT INFLOW LOAD.	SECOND CONSTITUENT INITIAL CONC.	SECOND CONSTITUENT INFLOW LOAD.	THIRD CONSTITUENT INITIAL CONC.	THIRD CONSTITUENT INFLOW LOAD	FOURTH CONSTITUENT INITIAL CONC.	FOURTH CONSTITUENT INFLOW LOAD	FIFTH CONSTITUENT INITIAL CONC.	FIFTH CONSTITUENT INFLOW LOAD
1	0.0	100.00	0.0								
2	0.0	4500.00	0.0								
3	0.0	250.00	0.0								
4	0.0	400.00	0.0								
5	0.0	600.00	0.0								
6	0.0	800.00	0.0								
7	0.0	1000.00	0.0								
8	0.0	1200.00	0.0								
9	0.0	1350.00	0.0								
10	0.0	1500.00	0.0								
11	0.0	3600.00	0.0								
12	0.0	2700.00	0.0								
13	0.0	1650.00	0.0								
14	0.0	1650.00	0.0								
15	0.0	1400.00	0.0								
16	0.0	1200.00	0.0								
17	-15.0	1000.00	1.21								
18	0.0	1000.00	0.0								
19	0.0	1200.00	0.0								
20	0.0	1000.00	0.0								
21	0.0	750.00	0.0								
22	0.0	500.00	0.0								
23	0.0	200.00	0.0								
24	0.0	75.00	0.0								
25	0.0	20.00	0.0								
26	0.0	16.00	0.0								
27	0.0	12.00	0.0								
28	0.0	8.00	0.0								
29	-200.0	4.00	16.15								
30	-400.0	12.00	32.31								
31	0.0	20.00	0.0								
32	0.0	20.00	0.0								
33	0.0	20.00	0.0								
34	-49.0	20.00	3.96								
35	0.0	18.00	0.0								
36	-83.0	18.00	6.70								
37	0.0	18.00	0.0								
38	0.0	18.00	0.0								
39	0.0	17.00	0.0								
40	-60.0	8.00	4.85								
41	0.0	15.00	0.0								
42	0.0	15.00	0.0								
43	-24.0	15.00	1.94								

44	0.0	15.00	0.0
45	0.0	12.00	0.0
46	0.0	8.00	0.0
47	-1500.0	4.00	40.39
48	0.0	15.00	0.0
49	0.0	15.00	0.0
50	0.0	15.00	0.0
51	0.0	15.00	0.0
52	0.0	15.00	0.0
53	0.0	15.00	0.0
54	-32.0	15.00	2.58
55	-255.0	15.00	68.66
56	0.0	15.00	0.0
57	-14.0	15.00	1.13
58	0.0	15.00	0.0
59	0.0	15.00	0.0
60	0.0	15.00	0.0
61	-175.0	15.00	14.14
62	0.0	15.00	0.0
63	0.0	15.00	0.0
64	0.0	15.00	0.0
65	-160.0	15.00	12.92
66	0.0	15.00	0.0
67	0.0	15.00	0.0
68	0.0	15.00	0.0
69	0.0	15.00	0.0
70	0.0	15.00	0.0
71	0.0	15.00	0.0
72	0.0	15.00	0.0
73	-64.0	15.00	5.17
74	0.0	15.00	0.0
75	0.0	15.00	0.0
76	-12300.0	15.00	993.53

SECTION 2.8 SET ADVECTIVE AND DISPERSIVE TRANSPORT FACTORS

TRANSPORT FACTORS

CHANNEL NUMBER	VARYING ADVECTION FLOOD TIDE	VARYING ADVECTION EBB TIDE	DIFFUSION FACTORS C4	DIFFUSION FACTORS (A:SQMI/D)
1	1.00	0.0	20.00	1.14
2	1.00	0.0	30.00	4.59
3	1.00	0.0	40.00	7.79
4	1.00	0.0	50.00	10.30
5	1.00	0.0	60.00	12.05
6	1.00	0.0	70.00	13.63
7	1.00	0.0	80.00	15.01
8	1.00	0.0	90.00	16.02
9	0.60	0.0	100.00	10.39
10	0.33	0.0	50.00	5.36
11	0.20	0.0	10.00	1.48
12	1.00	0.33	10.00	0.20
13	0.20	0.0	10.00	0.41
14	0.20	0.0	10.00	0.22
15	0.50	0.0	10.00	1.05
16	0.50	0.0	10.00	0.21
17	0.50	0.0	10.00	0.08
18	0.50	0.0	10.00	0.96
19	0.50	0.0	10.00	0.18
20	0.50	0.10	10.00	1.79
21	0.50	0.0	10.00	0.57
22	0.50	0.0	10.00	0.14
23	0.50	0.0	10.00	0.38
24	0.50	0.25	10.00	1.67
25	0.67	0.33	1.00	0.10
26	0.67	0.33	1.00	0.10
27	0.67	0.33	1.00	0.11
28	0.67	0.33	1.00	0.02
29	0.67	0.33	1.00	0.02
30	0.67	0.33	1.00	0.03
31	0.67	0.33	1.00	0.02
32	0.67	0.33	1.00	0.01
33	0.67	0.33	1.00	0.09
34	0.67	0.33	1.00	0.09
35	0.67	0.33	1.00	0.09
36	0.67	0.33	1.00	0.10
37	0.67	0.33	1.00	0.12
38	0.67	0.33	1.00	0.02
39	0.67	0.33	1.00	0.11
40	0.67	0.33	1.00	0.03
41	0.67	0.33	1.00	0.03
42	0.67	0.33	1.00	0.03
43	0.67	0.33	1.00	0.09
44	0.67	0.33	1.00	0.02

45	0.67	0.33	1.00	0.03
46	0.67	0.33	1.00	0.02
47	0.67	0.33	1.00	0.12
48	0.67	0.33	1.00	0.11
49	0.67	0.33	1.00	0.02
50	0.67	0.33	1.00	0.02
51	0.67	0.33	1.00	0.01
52	0.67	0.33	1.00	0.10
53	0.67	0.33	1.00	0.12
54	0.67	0.33	1.00	0.01
55	0.67	0.33	1.00	0.14
56	0.67	0.33	1.00	0.11
57	0.67	0.33	1.00	0.04
58	0.67	0.33	1.00	0.01
59	0.67	0.33	1.00	0.07
60	0.67	0.33	1.00	0.02
61	0.67	0.33	1.00	0.08
62	0.67	0.33	1.00	0.01
63	0.67	0.33	1.00	0.09
64	0.67	0.33	1.00	0.08
65	0.67	0.33	1.00	0.08
66	0.67	0.33	1.00	0.01
67	0.67	0.33	1.00	0.06
68	0.67	0.33	1.00	0.06
69	0.67	0.33	1.00	0.07
70	0.67	0.33	1.00	0.01
71	0.67	0.33	1.00	0.07
72	0.67	0.33	1.00	0.06
73	0.67	0.33	1.00	0.03
74	0.67	0.33	1.00	0.02
75	0.67	0.33	1.00	0.07
76	0.67	0.33	1.00	0.06
77	0.67	0.33	1.00	0.05
78	0.67	0.33	1.00	0.04
79	0.67	0.33	1.00	0.00
80	0.67	0.33	1.00	0.03
81	0.67	0.33	1.00	0.03
82	0.67	0.33	1.00	0.05

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                    SECTION 3.0  SIMULATE WATER QUALITY CONDITIONS (MAIN QUALITY LOOP)

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HIGH SLACK PREDICTIONS

JUNCTION NUMBER	HEAD (FT)	CONCENTRATION FACTORS 1ST. CONSTIT. (MGL)	2ND. CONSTIT. (MGL)	3RD. CONSTIT. (MGL)	4TH. CONSTIT. (MGL)	5TH. CONSTIT. (MGL)
		CYCLE 25	0 DAYS, 12.50 HOURS			
2	1.5904	4500.00	0.0	0.0	0.0	4500.00
- 11	1.8332	3970.21	0.0	0.0	0.0	3970.21
		CYCLE 26	0 DAYS, 13.00 HOURS			
12	1.4798	2997.81	0.0	0.0	0.0	2997.81
13	1.8773	1533.38	0.0	0.0	0.0	1533.38
- 20	2.1308	1220.11	0.0	0.0	0.0	1220.11
		CYCLE 27	0 DAYS, 13.50 HOURS			
22	1.6707	586.60	0.0	0.0	0.0	586.60
23	2.0879	308.86	0.0	0.0	0.0	308.86
24	2.2690	138.28	0.0	0.0	0.0	138.28
25	2.4412	53.84	0.0	0.0	0.0	53.84
- 31	2.5919	26.23	0.0	0.0	0.0	26.23
		CYCLE 28	0 DAYS, 14.00 HOURS			
32	2.1836	21.12	0.0	0.0	0.0	21.12
33	2.3743	20.45	0.0	0.0	0.0	20.45
34	2.5730	19.68	0.0	0.0	0.0	19.68
36	2.7310	18.94	0.0	0.0	0.0	18.94
- 38	2.8812	17.56	0.0	0.0	0.0	17.56
		CYCLE 29	0 DAYS, 14.50 HOURS			
42	2.4827	16.30	0.0	0.0	0.0	16.30
43	2.6701	15.16	0.0	0.0	0.0	15.16
44	2.8997	14.89	0.0	0.0	0.0	14.89
48	3.0623	14.93	0.0	0.0	0.0	14.93
- 49	3.2537	14.97	0.0	0.0	0.0	14.97
		CYCLE 30	0 DAYS, 15.00 HOURS			

51	2.9634	15.05	0.0	0.0	0.0	15.05
52	3.1209	15.07	0.0	0.0	0.0	15.07
55	3.2597	15.32	0.0	0.0	0.0	15.32
56	3.4087	15.28	0.0	0.0	0.0	15.28
58	3.5823	15.18	0.0	0.0	0.0	15.18
59	3.7265	15.09	0.0	0.0	0.0	15.09
- 60	3.8808	15.06	0.0	0.0	0.0	15.06
	CYCLE 31	0 DAYS, 15.50 HOURS				
62	3.6755	15.05	0.0	0.0	0.0	15.05
63	3.8396	15.03	0.0	0.0	0.0	15.03
64	4.0206	15.03	0.0	0.0	0.0	15.03
66	4.1814	15.04	0.0	0.0	0.0	15.04
68	4.3264	15.04	0.0	0.0	0.0	15.04
69	4.4736	15.05	0.0	0.0	0.0	15.05
70	4.6071	15.06	0.0	0.0	0.0	15.06
71	4.7326	15.05	0.0	0.0	0.0	15.05
- 72	4.8225	14.99	0.0	0.0	0.0	14.99
	CYCLE 32	0 DAYS, 16.00 HOURS				
74	4.5155	14.97	0.0	0.0	0.0	14.97
75	4.6057	15.06	0.0	0.0	0.0	15.06
76	4.8075	15.11	0.0	0.0	0.0	15.11

LOW SLACK PREDICTIONS

JUNCTION NUMBER	HEAD (FT)	CONCENTRATION FACTORS 1ST. CONSTIT. (MGL)	2ND. CONSTIT. (MGL)	3RD. CONSTIT. (MGL)	4TH. CONSTIT. (MGL)	5TH. CONSTIT. (MGL)
		CYCLE 39	0 DAYS, 19.50 HOURS			
2	-0.8909	1040.43	0.0	0.0	0.0	1040.43
- 11	-1.1308	997.39	0.0	0.0	0.0	997.39
		CYCLE 40	0 DAYS, 20.00 HOURS			
12	-0.6047	546.97	0.0	0.0	0.0	546.97
13	-1.0628	317.77	0.0	0.0	0.0	317.77
- 20	-1.4318	55.43	0.0	0.0	0.0	55.43
		CYCLE 41	0 DAYS, 20.50 HOURS			
22	-1.0813	20.27	0.0	0.0	0.0	20.27
23	-1.3909	5.51	0.0	0.0	0.0	5.51
24	-1.6609	21.46	0.0	0.0	0.0	21.46
0 25	-1.9023	20.41	0.0	0.0	0.0	20.41
		CYCLE 42	0 DAYS, 21.00 HOURS			
31	-1.2072	19.04	0.0	0.0	0.0	19.04
32	-1.4818	17.15	0.0	0.0	0.0	17.15
33	-1.7692	16.11	0.0	0.0	0.0	16.11
- 34	-2.0092	14.71	0.0	0.0	0.0	14.71
		CYCLE 43	0 DAYS, 21.50 HOURS			
36	-1.2997	14.29	0.0	0.0	0.0	14.29
38	-1.6101	14.71	0.0	0.0	0.0	14.71
42	-1.8314	14.70	0.0	0.0	0.0	14.70
- 43	-2.0335	14.68	0.0	0.0	0.0	14.68
		CYCLE 44	0 DAYS, 22.00 HOURS			
44	-1.5089	14.73	0.0	0.0	0.0	14.73
48	-1.7596	15.19	0.0	0.0	0.0	15.19
49	-2.0078	15.17	0.0	0.0	0.0	15.17

- 51	-2.1820	15.32	0.0	0.0	0.0	15.32
		CYCLE 45	0 DAYS, 22.50 HOURS			
52	-1.5752	15.22	0.0	0.0	0.0	15.22
55	-1.7859	15.12	0.0	0.0	0.0	15.12
56	-1.9779	14.89	0.0	0.0	0.0	14.89
- 58	-2.1206	15.03	0.0	0.0	0.0	15.03
		CYCLE 46	0 DAYS, 23.00 HOURS			
59	-1.3772	14.93	0.0	0.0	0.0	14.93
60	-1.6567	14.92	0.0	0.0	0.0	14.92
62	-1.8413	14.95	0.0	0.0	0.0	14.95
63	-1.9496	14.99	0.0	0.0	0.0	14.99
- 64	-2.0046	15.02	0.0	0.0	0.0	15.02
		CYCLE 47	0 DAYS, 23.50 HOURS			
66	-1.4930	14.97	0.0	0.0	0.0	14.97
68	-1.6978	14.96	0.0	0.0	0.0	14.98
69	-1.8442	15.00	0.0	0.0	0.0	15.00
70	-1.9299	14.99	0.0	0.0	0.0	14.99
- 71	-1.9332	14.97	0.0	0.0	0.0	14.97
		CYCLE 48	1 DAYS, 24.00 HOURS			
72	-1.5776	14.90	0.0	0.0	0.0	14.90
- 74	-1.6279	14.94	0.0	0.0	0.0	14.94
		CYCLE 49	1 DAYS, 0.50 HOURS			
76	-0.2466	14.86	0.0	0.0	0.0	14.86

JUNCTION NUMBER	HEAD (FT)	CONCENTRATION FACTORS 1ST. CONSTIT. (MGL)	2ND. CONSTIT. (MGL)	3RD. CONSTIT. (MGL)	4TH. CONSTIT. (MGL)	5TH. CONSTIT. (MGL)
		CYCLE 700	14 DAYS, 14.00 HOURS			
2	1.5904	3655.00	0.0	0.0	0.0	3655.00
_ 11	1.8332	3255.72	0.0	0.0	0.0	3255.72
		CYCLE 701	14 DAYS, 14.50 HOURS			
12	1.4798	2333.86	0.0	0.0	0.0	2333.86
13	1.8773	1432.58	0.0	0.0	0.0	1432.58
_ 20	2.1308	1103.03	0.0	0.0	0.0	1103.03
		CYCLE 702	14 DAYS, 15.00 HOURS			
22	1.8707	582.71	0.0	0.0	0.0	582.71
23	2.0879	338.41	0.0	0.0	0.0	338.41
24	2.2690	170.26	0.0	0.0	0.0	170.26
25	2.4412	70.17	0.0	0.0	0.0	70.17
_ 31	2.5919	27.34	0.0	0.0	0.0	27.34
		CYCLE 703	14 DAYS, 15.50 HOURS			
32	2.1836	15.71	0.0	0.0	0.0	15.71
33	2.3743	13.87	0.0	0.0	0.0	13.87
34	2.5730	14.07	0.0	0.0	0.0	14.07
36	2.7310	14.26	0.0	0.0	0.0	14.26
0 38	2.8812	14.30	0.0	0.0	0.0	14.30
		CYCLE 704	14 DAYS, 16.00 HOURS			
42	2.4827	14.29	0.0	0.0	0.0	14.29
43	2.6701	14.24	0.0	0.0	0.0	14.24
44	2.8997	14.41	0.0	0.0	0.0	14.41
48	3.0623	14.72	0.0	0.0	0.0	14.72
_ 49	3.2537	15.07	0.0	0.0	0.0	15.07
		CYCLE 705	14 DAYS, 16.50 HOURS			

51	2.9634	15.36	0.0	0.0	0.0	15.36
52	3.1209	15.43	0.0	0.0	0.0	15.43
55	3.2597	15.55	0.0	0.0	0.0	15.55
56	3.4087	15.33	0.0	0.0	0.0	15.33
58	3.5823	15.05	0.0	0.0	0.0	15.05
59	3.7265	14.88	0.0	0.0	0.0	14.88
60	3.8808	14.83	0.0	0.0	0.0	14.83
		CYCLE 706	14 DAYS, 17.00 HOURS			
62	3.6755	14.85	0.0	0.0	0.0	14.85
63	3.8396	14.85	0.0	0.0	0.0	14.85
64	4.0206	14.88	0.0	0.0	0.0	14.88
66	4.1814	14.90	0.0	0.0	0.0	14.90
68	4.3264	14.92	0.0	0.0	0.0	14.92
69	4.4736	14.93	0.0	0.0	0.0	14.93
70	4.6071	14.95	0.0	0.0	0.0	14.95
71	4.7326	14.95	0.0	0.0	0.0	14.95
72	4.8225	14.96	0.0	0.0	0.0	14.96
		CYCLE 707	14 DAYS, 17.50 HOURS			
74	4.5155	14.99	0.0	0.0	0.0	14.99
75	4.6057	15.05	0.0	0.0	0.0	15.05
76	4.8075	15.11	0.0	0.0	0.0	15.11

LOW SLACK PREDICTIONS

JUNCTION NUMBER	HEAD (FT)	CONCENTRATION FACTORS 1ST. CONSTIT. (MGL)	2ND. CONSTIT. (MGL)	3RD. CONSTIT. (MGL)	4TH. CONSTIT. (MGL)	5TH. CONSTIT. (MGL)
		CYCLE 714	14 DAYS, 21.00 HOURS			
2	-0.8909	902.52	0.0	0.0	0.0	902.52
_ 11	-1.1308	867.55	0.0	0.0	0.0	867.55
		CYCLE 715	14 DAYS, 21.50 HOURS			
12	-0.6047	502.08	0.0	0.0	0.0	502.08
13	-1.0628	316.17	0.0	0.0	0.0	316.17
_ 20	-1.4318	81.88	0.0	0.0	0.0	81.88
		CYCLE 716	14 DAYS, 22.00 HOURS			
22	-1.0813	27.86	0.0	0.0	0.0	27.86
23	-1.3909	1.84	0.0	0.0	0.0	1.84
24	-1.6609	12.00	0.0	0.0	0.0	12.00
_ 25	-1.9023	13.92	0.0	0.0	0.0	13.92
		CYCLE 717	14 DAYS, 22.50 HOURS			
31	-1.2072	14.33	0.0	0.0	0.0	14.33
32	-1.4818	14.16	0.0	0.0	0.0	14.16
33	-1.7692	14.39	0.0	0.0	0.0	14.39
0 34	-2.0092	14.13	0.0	0.0	0.0	14.13
		CYCLE 718	14 DAYS, 23.00 HOURS			
36	-1.2997	14.27	0.0	0.0	0.0	14.27
38	-1.6101	14.34	0.0	0.0	0.0	14.34
42	-1.8314	14.52	0.0	0.0	0.0	14.52
_ 43	-2.0335	14.65	0.0	0.0	0.0	14.65
		CYCLE 719	14 DAYS, 23.50 HOURS			
44	-1.5089	14.87	0.0	0.0	0.0	14.87
48	-1.7596	15.61	0.0	0.0	0.0	15.61
49	-2.0078	15.35	0.0	0.0	0.0	15.35

- 51	-2.1820	15.33	0.0	0.0	0.0	15.33
		CYCLE 720	15 DAYS, 24.00 HOURS			
52	-1.5752	15.04	0.0	0.0	0.0	15.04
55	-1.7859	14.89	0.0	0.0	0.0	14.89
56	-1.9779	14.66	0.0	0.0	0.0	14.66
- 58	-2.1206	14.82	0.0	0.0	0.0	14.82
		CYCLE 721	15 DAYS, 0.50 HOURS			
59	-1.3772	14.74	0.0	0.0	0.0	14.74
60	-1.6567	14.77	0.0	0.0	0.0	14.77
62	-1.8413	14.82	0.0	0.0	0.0	14.82
63	-1.9496	14.87	0.0	0.0	0.0	14.87
0 64	-2.0046	14.90	0.0	0.0	0.0	14.90
		CYCLE 722	15 DAYS, 1.00 HOURS			
66	-1.4930	14.86	0.0	0.0	0.0	14.86
68	-1.6978	14.88	0.0	0.0	0.0	14.88
69	-1.8442	14.92	0.0	0.0	0.0	14.92
70	-1.9299	14.94	0.0	0.0	0.0	14.94
- 71	-1.9332	14.96	0.0	0.0	0.0	14.96
		CYCLE 723	15 DAYS, 1.50 HOURS			
72	-1.5776	14.91	0.0	0.0	0.0	14.91
- 74	-1.6279	14.93	0.0	0.0	0.0	14.93
		CYCLE 724	15 DAYS, 2.00 HOURS			
76	-0.2466	14.86	0.0	0.0	0.0	14.86

RESTART DECK TAPE WAS LAST WRITTEN AFTER CYCLE 725
HYDRAULIC CYCLE ON EXTRACT TAPE FOR RESTARTING = 168
NTAG = 4

THE TOTAL MASS (TONS) FOR EACH CONSTITUENT AT CYCLE 725 IS AS FOLLOWS

120591944253440000.00

THE TOTAL MASS (TONS) DEPLETED FOR EACH CONSTITUENT AS OF CYCLE 725 IS AS FOLLOWS

0.0

STARTS AT CYCLE 700 (14 DAYS 14.0 HOURS)

WATER QUALITY SUMMARY

ENDS AT CYCLE 725 (15 DAYS 2.5 HOURS)

JUNC	CONSTITUENT 1			CONSTITUENT 2			CONSTITUENT 3			CONSTITUENT 4			CONSTITUENT 5		
	MIN	MAX	AVE	MIN	MAX	AVE	MIN	MAX	AVE	MIN	MAX	AVE	MIN	MAX	AVE
1	100.00	100.00	100.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.00	100.00	100.00
2	902.52	4500.00	2466.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	902.52	4500.00	2466.01
3	135.23	397.15	240.66	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	135.23	397.15	240.66
4	195.35	585.52	368.75	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	195.35	585.52	368.75
5	268.60	754.08	497.05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	268.60	754.08	497.05
6	365.45	878.61	618.79	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	365.45	878.61	618.79
7	473.96	975.21	734.32	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	473.96	975.21	734.32
8	585.53	1030.63	836.07	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	585.53	1030.63	836.07
9	708.38	1056.70	916.33	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	708.38	1056.70	916.33
10	880.10	1089.80	979.90	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	880.10	1089.80	979.90
11	867.55	3951.00	2163.10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	867.55	3951.00	2163.10
12	502.08	2671.77	1345.72	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	502.08	2671.77	1345.72
13	310.91	1515.73	799.88	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	310.91	1515.73	799.88
14	514.25	675.13	606.91	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	514.25	675.13	606.91
15	529.58	562.82	553.33	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	529.58	562.82	553.33
16	552.55	563.59	559.82	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	552.55	563.59	559.82
17	560.29	571.55	566.65	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	560.29	571.55	566.65
18	288.73	997.59	602.81	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	288.73	997.59	602.81
19	589.57	766.39	678.14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	589.57	766.39	678.14
20	81.88	1103.03	545.79	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	81.88	1103.03	545.79
21	166.41	615.07	410.75	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	166.41	615.07	410.75
22	27.66	582.71	268.94	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	27.66	582.71	268.94
23	1.65	338.41	130.02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.65	338.41	130.02
24	8.34	170.26	59.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.34	170.26	59.50
25	10.85	70.17	26.80	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.85	70.17	26.80
26	1.35	10.84	5.72	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.35	10.84	5.72
27	10.17	16.00	12.53	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.17	16.00	12.53
28	12.25	13.05	12.72	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.25	13.05	12.72
29	13.50	13.96	13.72	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.50	13.96	13.72
30	16.13	22.47	18.55	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.13	22.47	18.55
31	12.70	27.34	16.47	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.70	27.34	16.47
32	13.01	15.71	14.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.01	15.71	14.00
33	13.73	14.56	14.17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.73	14.56	14.17
34	14.07	14.34	14.21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.07	14.34	14.21
35	14.15	14.38	14.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.15	14.38	14.30
36	14.21	14.32	14.27	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.21	14.32	14.27
37	13.98	14.36	14.21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.98	14.36	14.21
38	14.21	14.38	14.29	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.21	14.38	14.29
39	14.07	14.39	14.27	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.07	14.39	14.27
40	13.69	14.11	13.97	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.69	14.11	13.97
41	14.14	14.34	14.24	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.14	14.34	14.24
42	14.22	14.54	14.34	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.22	14.54	14.34
43	14.23	14.65	14.40	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.23	14.65	14.40
44	14.36	14.91	14.63	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.36	14.91	14.63
45	3.36	8.86	6.48	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.36	8.86	6.48
46	4.47	4.89	4.64	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.47	4.89	4.64
47	5.07	5.19	5.12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.07	5.19	5.12
48	14.72	15.66	15.21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.72	15.66	15.21

49	15.07	15.46	15.32	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.07	15.46	15.32
50	15.07	15.30	15.24	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.07	15.30	15.24
51	15.28	15.49	15.40	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.28	15.49	15.40
52	15.04	15.49	15.33	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.04	15.49	15.33
53	14.94	15.43	15.25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.94	15.43	15.25
54	14.10	14.66	14.47	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.10	14.66	14.47
55	14.89	15.56	15.25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.89	15.56	15.25
56	14.65	15.33	14.94	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.65	15.33	14.94
57	14.23	14.50	14.41	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.23	14.50	14.41
58	14.76	15.05	14.87	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.76	15.05	14.87
59	14.74	14.88	14.82	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.74	14.88	14.82
60	14.77	14.86	14.82	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.77	14.86	14.82
61	14.58	14.74	14.68	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.58	14.74	14.68
62	14.78	14.89	14.84	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.78	14.89	14.84
63	14.80	14.91	14.86	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.80	14.91	14.86
64	14.83	14.92	14.88	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.83	14.92	14.88
65	14.69	14.87	14.82	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.69	14.87	14.82
66	14.85	14.94	14.90	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.85	14.94	14.90
67	14.82	14.93	14.89	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.82	14.93	14.89
68	14.87	14.95	14.92	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.87	14.95	14.92
69	14.88	14.96	14.93	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.88	14.96	14.93
70	14.89	14.97	14.94	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.89	14.97	14.94
71	14.89	14.98	14.95	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.89	14.98	14.95
72	14.88	15.00	14.96	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.88	15.00	14.96
73	14.60	14.81	14.73	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.60	14.81	14.73
74	14.85	15.03	14.97	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.85	15.03	14.97
75	14.80	15.08	14.98	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.80	15.08	14.98
76	14.86	15.11	15.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.86	15.11	15.00

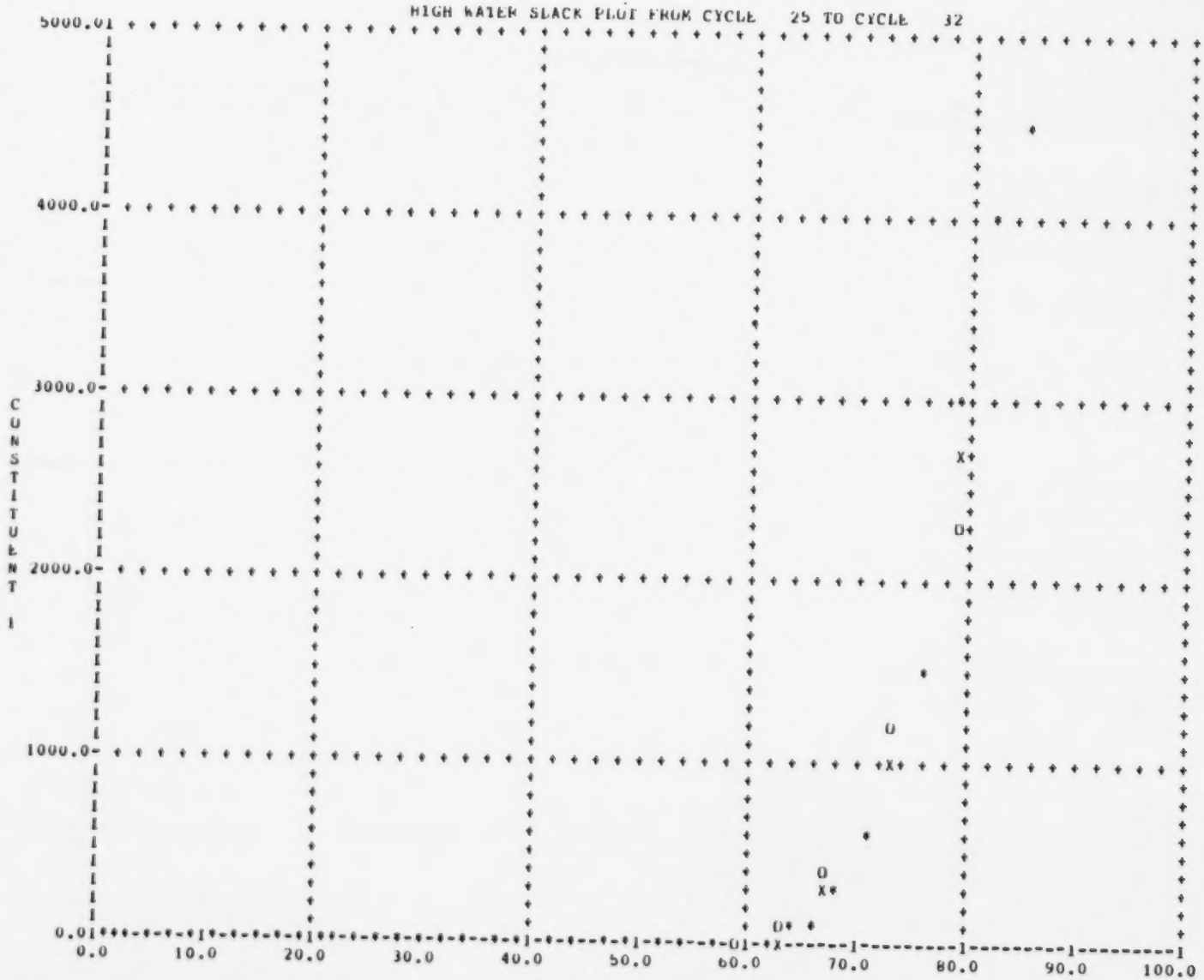
STATISTICAL ANALYSIS OF CONSTITUENT 1 CONCENTRATIONS FROM CYCLE 700 TO CYCLE 725

JUNC	MEAN	ST DEV	SKEWNESS	KURTOSIS	CUMULATIVE PROBABILITIES 00	10	20	30	40	50	60	70	80	90	100
2	2466.02	1042.92	0.16	-1.05	902.52	977.98	1242.27	1556.61	1883.65	2210.69	2677.99	3143.60	3255.72	3655.00	4172.95
11	2163.10	1011.28	0.22	-1.32	867.55	890.93	1007.09	1237.27	1566.07	1871.52	2386.37	2818.84	3143.60	3257.75	3817.60
12	1345.72	718.20	0.39	-1.29	502.08	507.07	598.14	679.77	898.41	1032.86	1366.66	1807.74	2058.69	2308.51	2470.94
13	799.88	408.70	0.39	-1.28	310.91	316.17	355.23	407.82	541.91	623.98	814.75	1020.51	1205.48	1384.73	1432.58
20	545.79	372.23	0.23	-1.46	81.88	86.70	128.24	205.03	311.48	425.07	572.70	777.31	914.17	1052.21	1101.02
22	268.94	202.21	0.29	-1.44	27.66	27.86	51.11	72.03	133.40	174.55	279.94	403.50	482.82	546.22	580.94
23	130.02	124.14	0.47	-1.35	1.65	1.84	4.02	10.26	39.03	62.86	131.48	189.71	248.16	299.76	332.22
24	59.50	58.49	0.74	-1.05	6.34	9.01	9.80	11.31	13.15	20.68	42.41	75.79	105.74	137.21	161.93
25	26.80	20.14	1.04	-0.47	10.85	11.13	11.78	12.59	13.51	13.89	14.93	28.69	41.39	55.69	66.87
31	16.47	4.46	1.42	0.62	12.70	13.15	13.44	13.77	14.15	14.29	14.38	15.29	19.29	24.03	27.03
32	14.00	0.68	0.95	0.78	13.01	13.06	13.31	13.54	13.75	13.94	14.07	14.17	14.19	14.64	15.63

END OF QUALITY RUN. 725 CYCLES.

DELAWARE ESTUARY CENTER CHANNEL

HIGH WATER SLACK PLOT FROM CYCLE 25 TO CYCLE 32

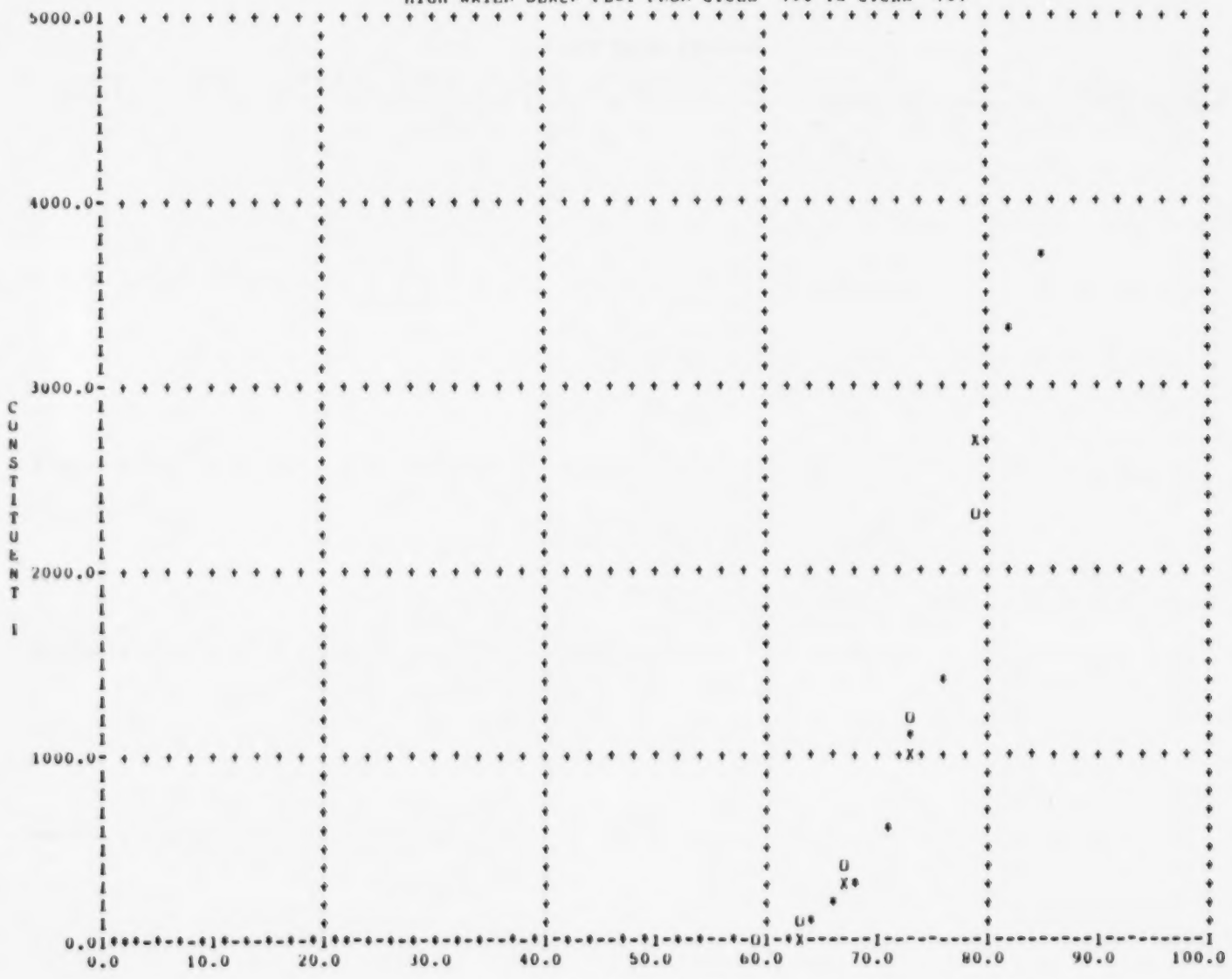


DELAWARE ESTUARY CENTER CHANNEL

LOW WATER SLACK PLOT FROM CYCLE 25 TO CYCLE 49

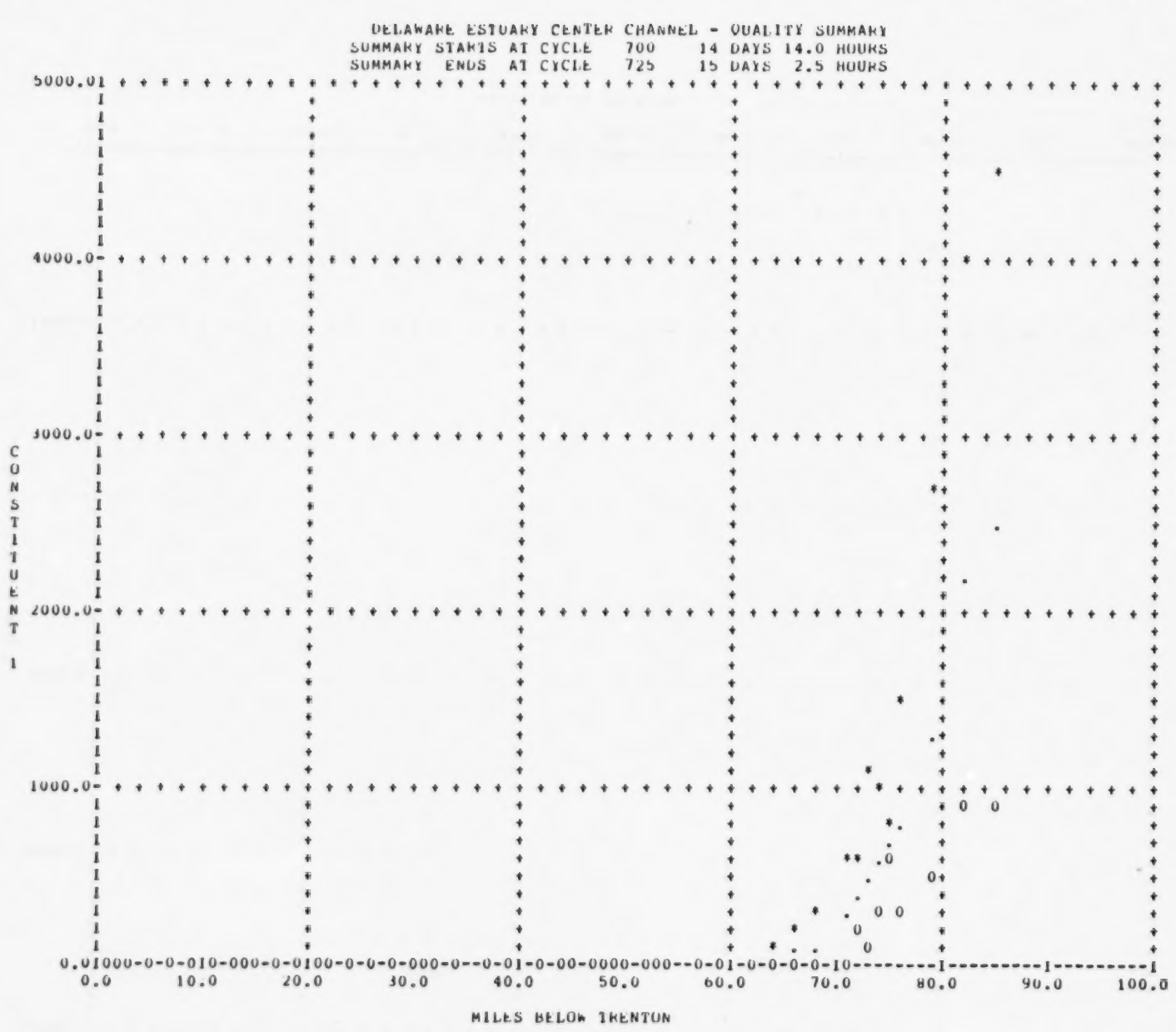
DELAWARE ESTUARY CENTER CHANNEL

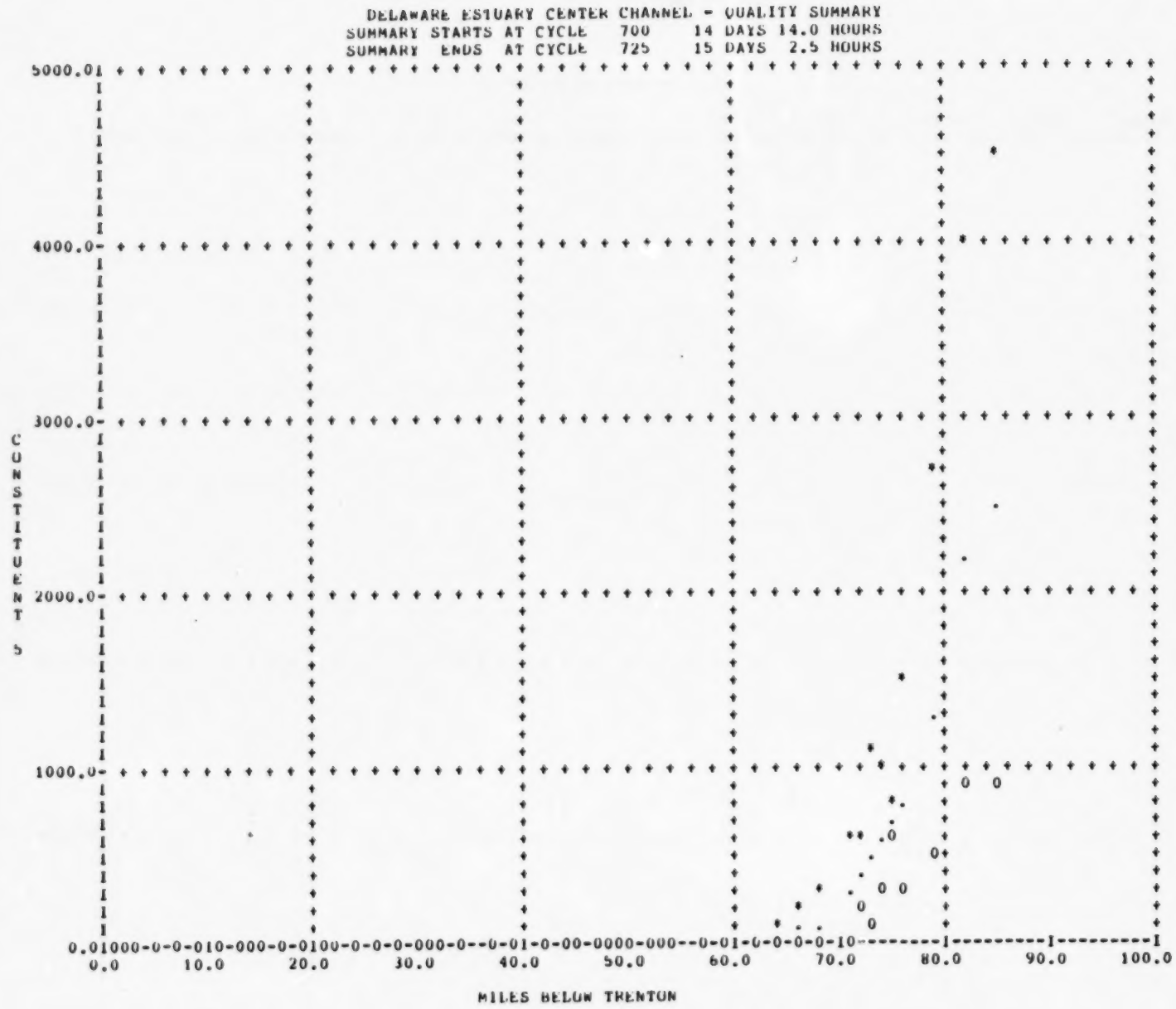
HIGH WATER SLACK PLOT FROM CYCLE 700 TO CYCLE 707

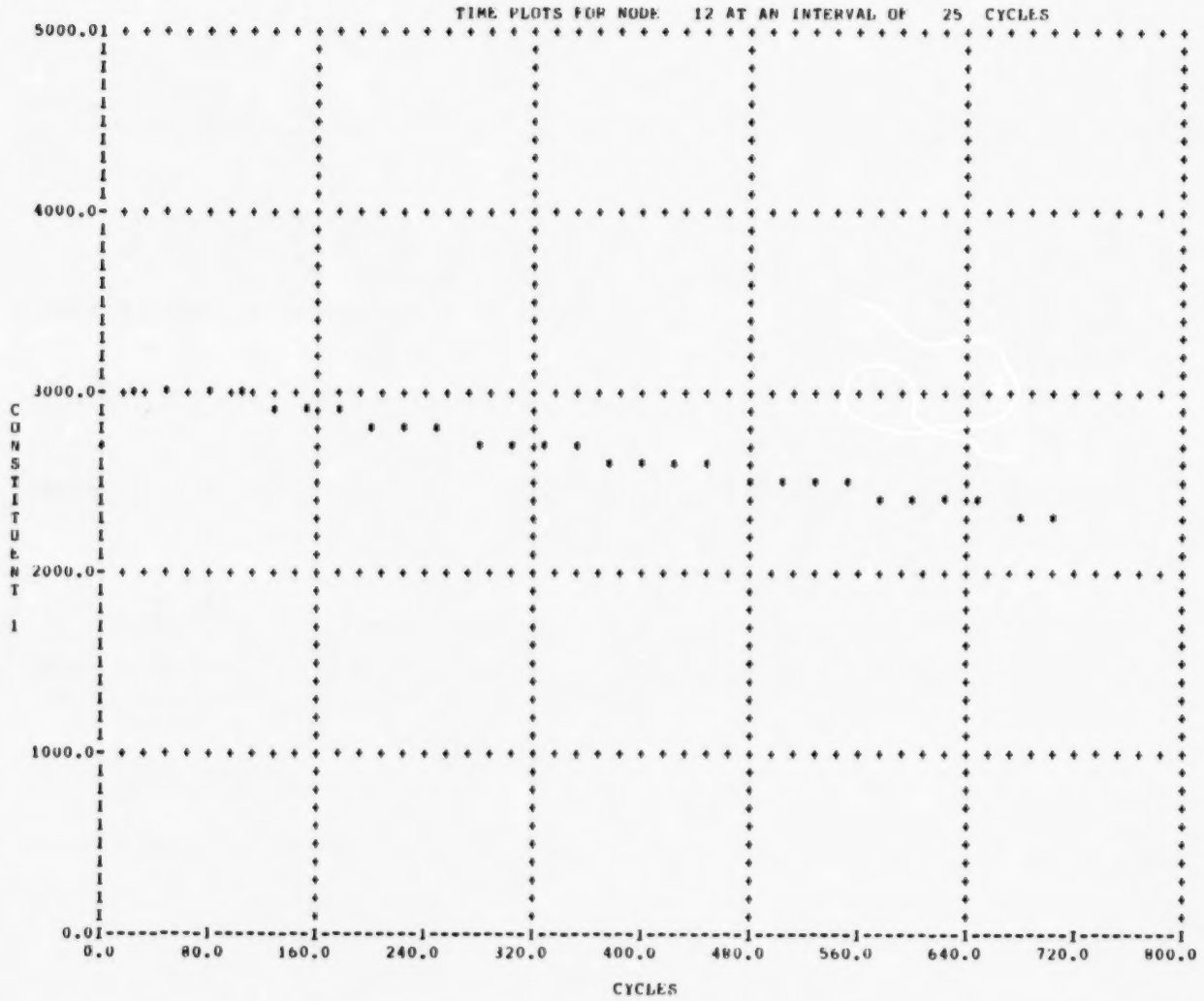


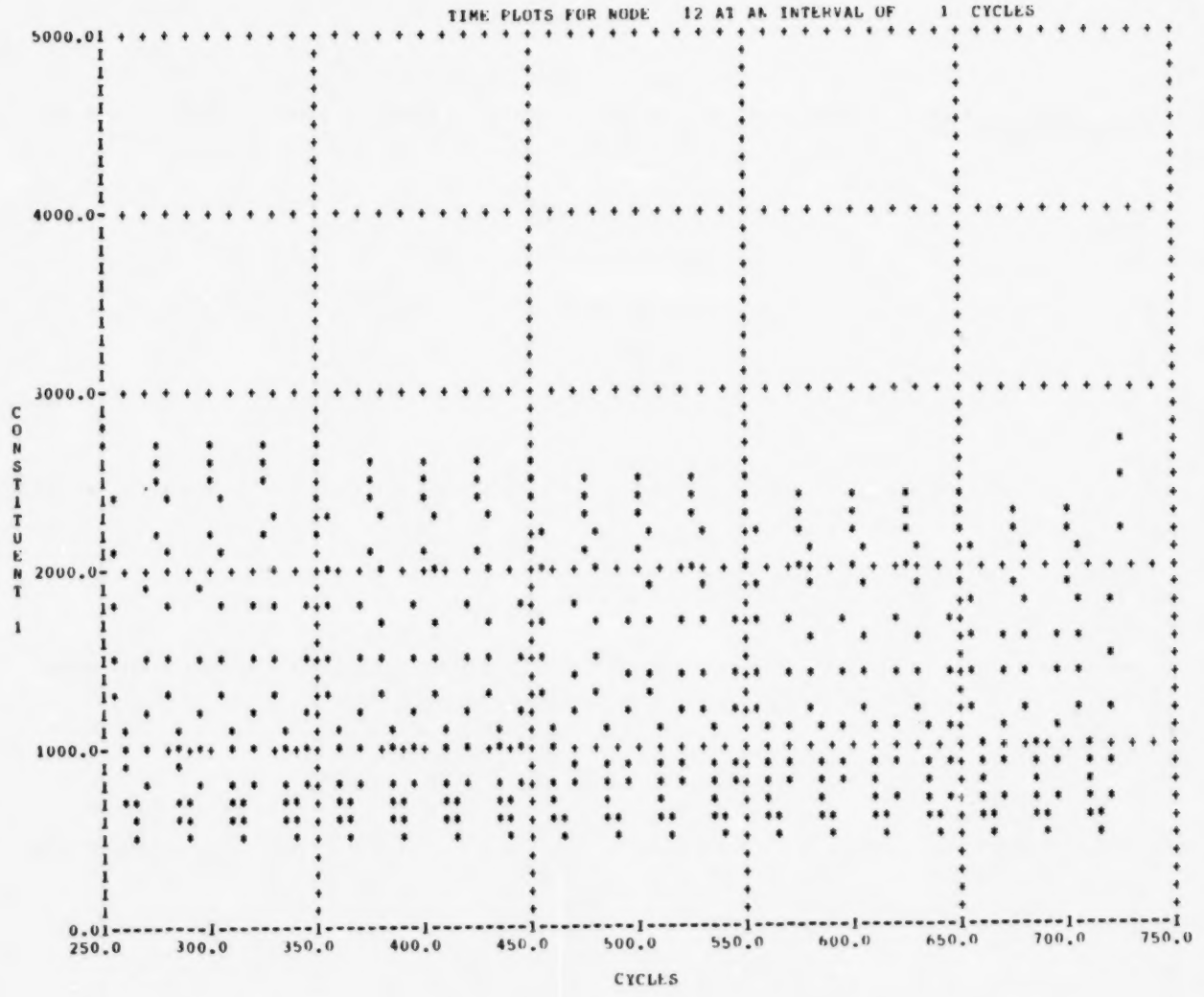
DELAWARE ESTUARY CENTER CHANNEL

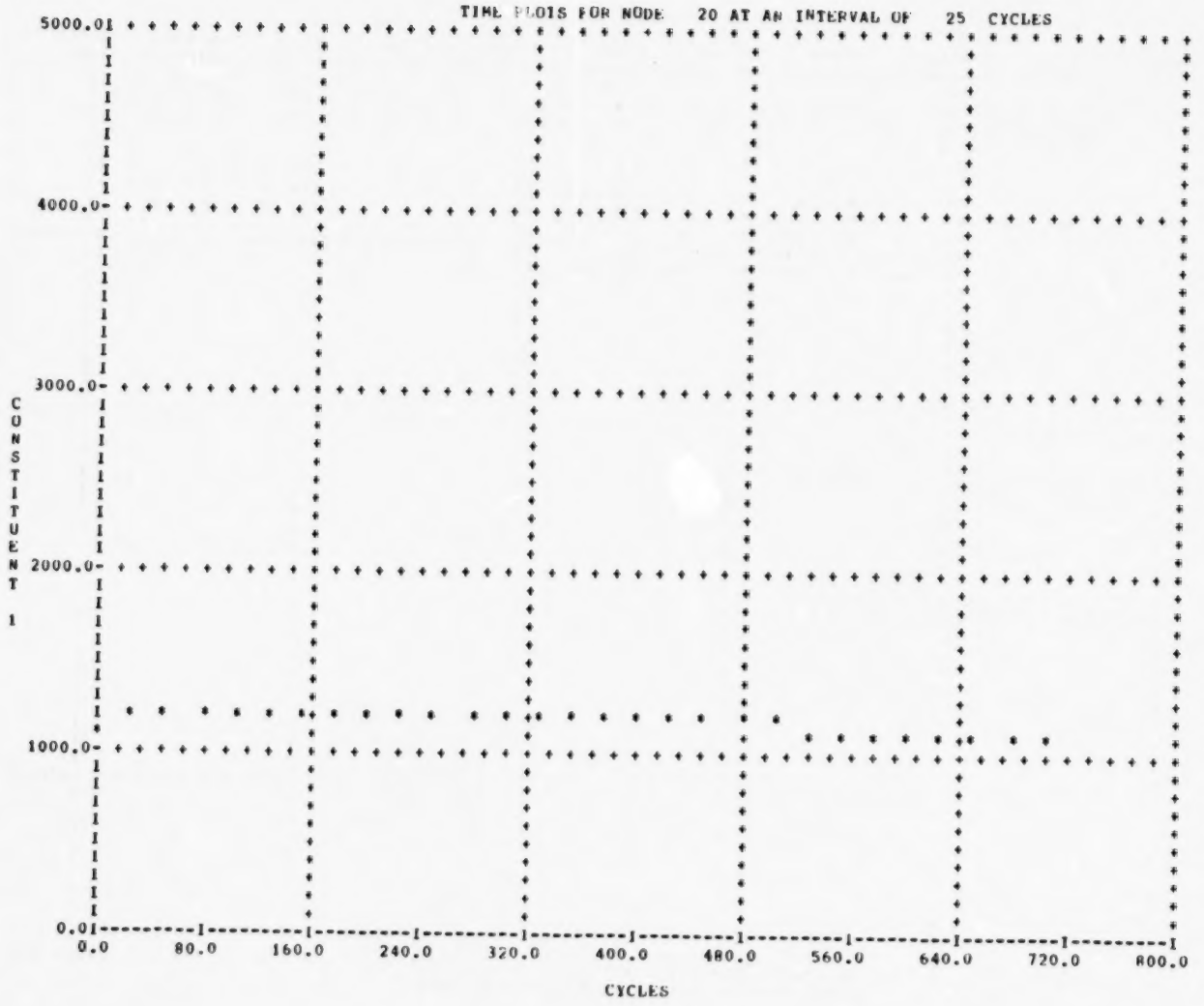
LOW WATER SLACK PLOT FROM CYCLE 700 TO CYCLE 724

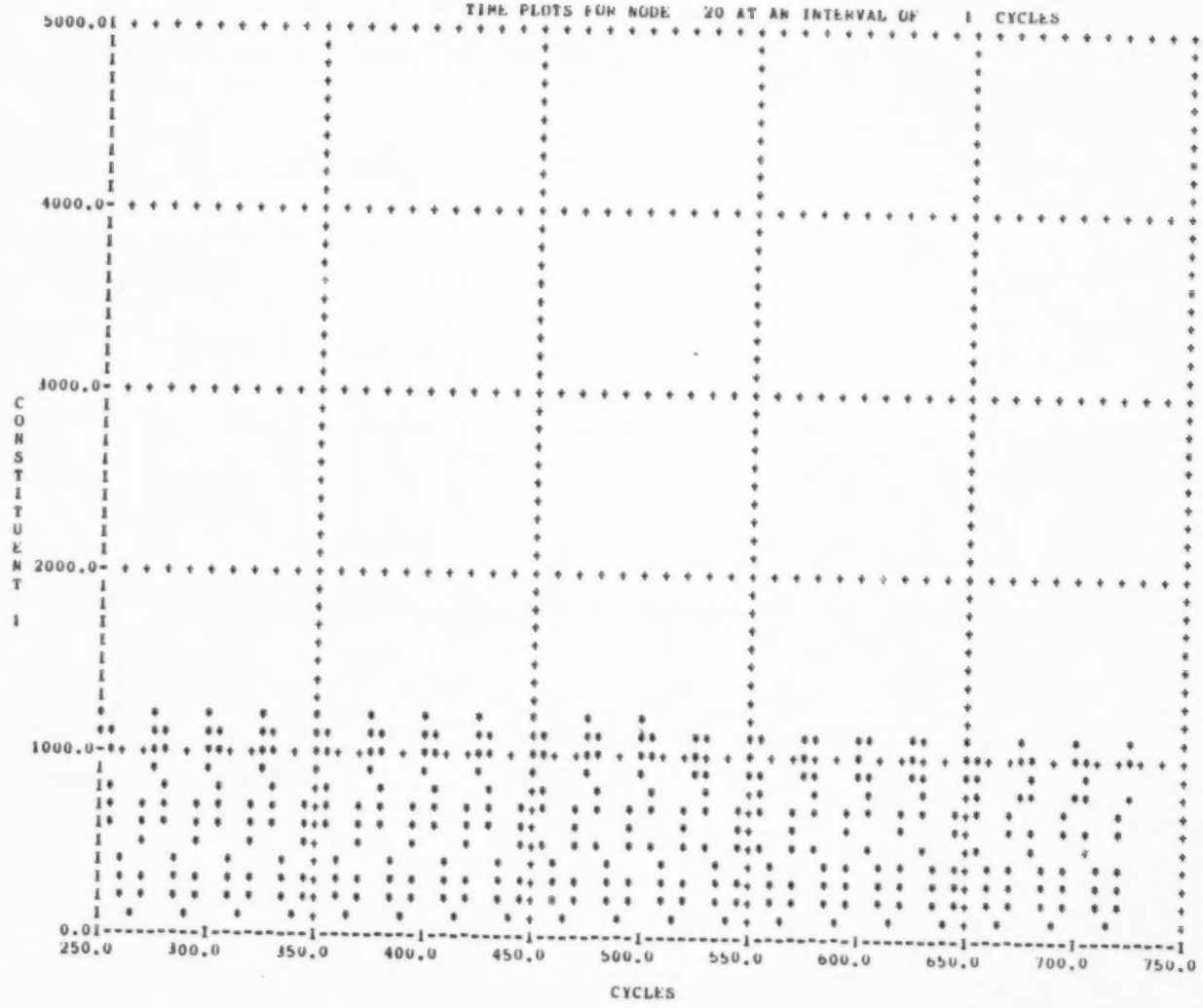

DELAWARE ESTUARY CENTER CHANNEL - QUALITY SUMMARY
SUMMARY STARTS AT CYCLE 700 14 DAYS 14.0 HOURS
SUMMARY ENDS AT CYCLE 725 15 DAYS 2.5 HOURS
5000.0
4000.0
3000.0
2000.0
1000.0
0.0
CONSTITUENT 1
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
MILES BELOW TRENTON

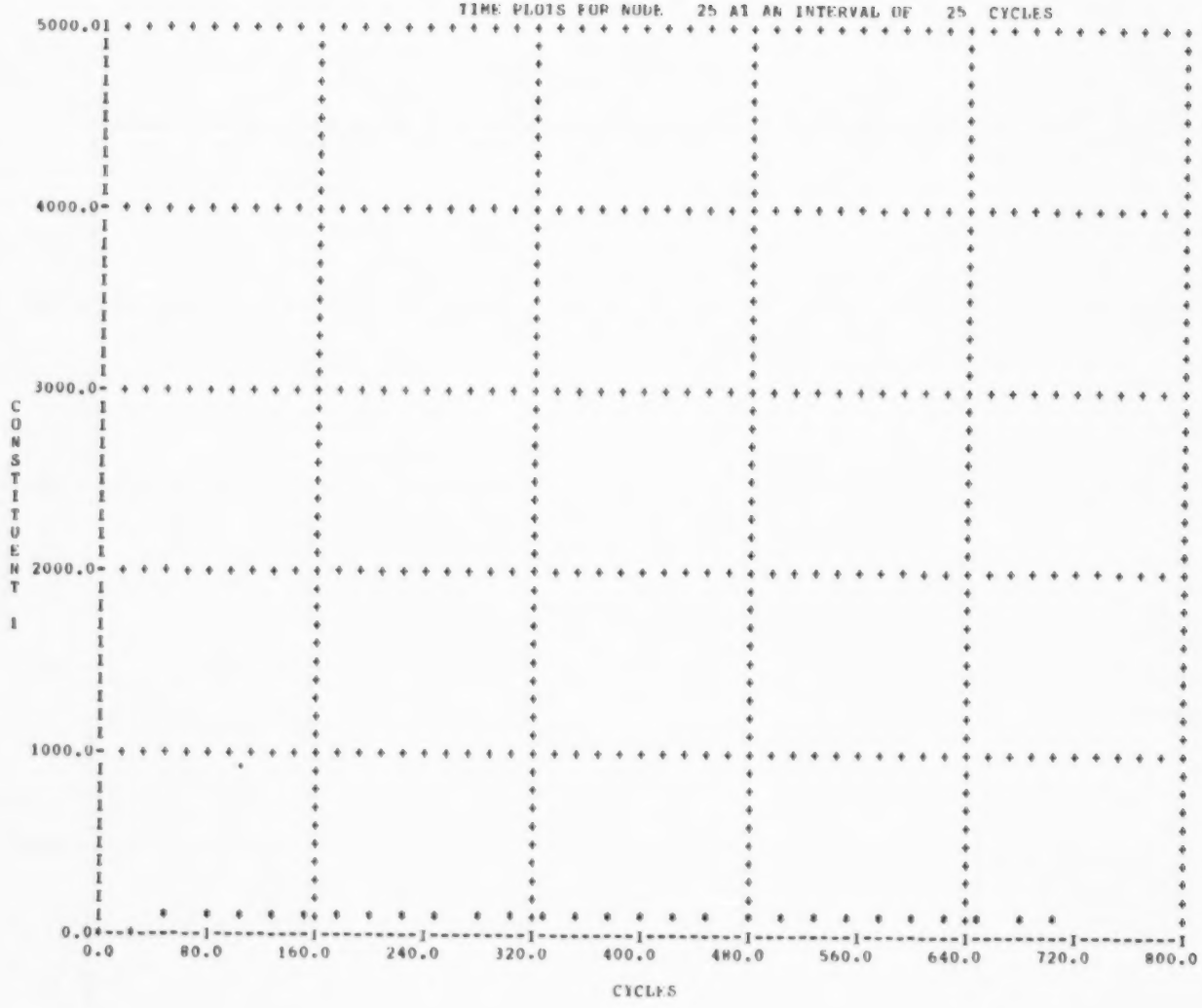

DELAWARE ESTUARY CENTER CHANNEL - QUALITY SUMMARY
SUMMARY STARTS AT CYCLE 700 14 DAYS 14.0 HOURS
SUMMARY ENDS AT CYCLE 725 15 DAYS 2.5 HOURS
5000.0
4000.0
3000.0
2000.0
1000.0
0.0
CONSTITUENTS
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
MILES BELOW TRENTON

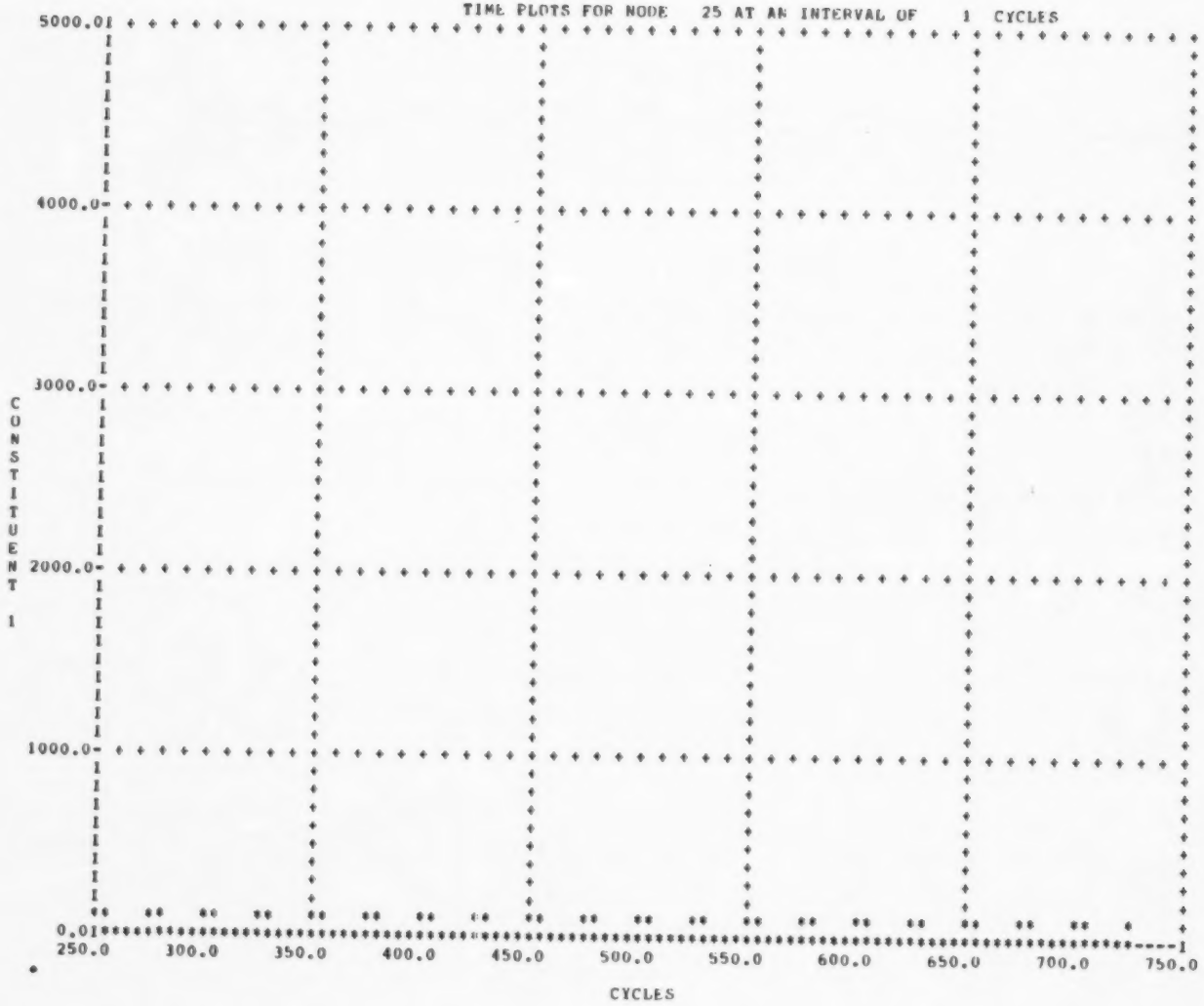

TIME PLOTS FOR NODE 12 AT AN INTERVAL OF 25 CYCLES
5000.0
4000.0
3000.0
2000.0
1000.0
0.0
CONSTITUENT 1
0.0
80.0
160.0
240.0
320.0
400.0
480.0
560.0
640.0
720.0
800.0
CYCLES

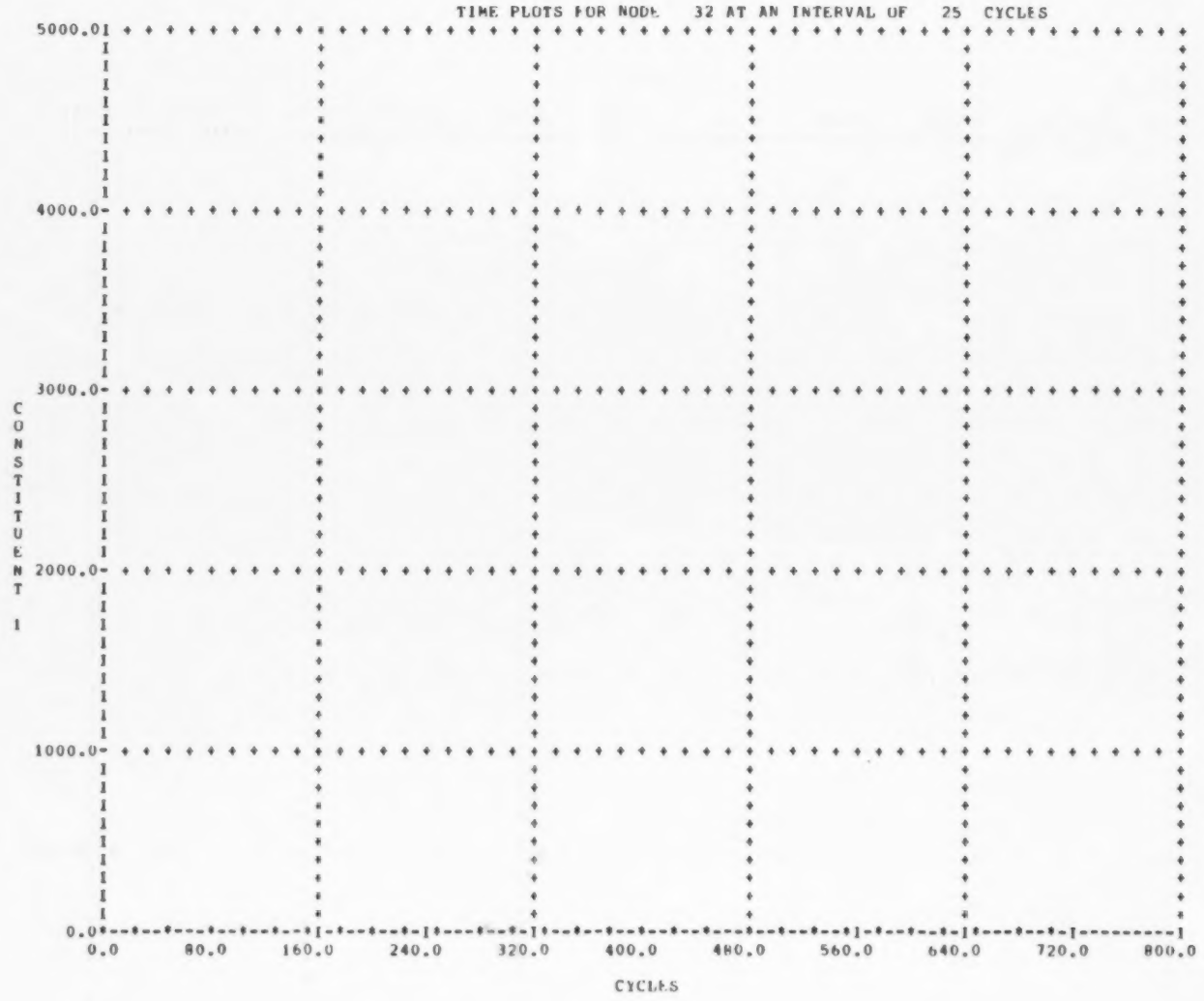

TIME PLOTS FOR NODE 12 AT AN INTERVAL OF 1 CYCLES
5000.0
4000.0
3000.0
2000.0
1000.0
0.0
CONSTITUENT 1
250.0
300.0
350.0
400.0
450.0
500.0
550.0
600.0
650.0
700.0
750.0
CYCLES

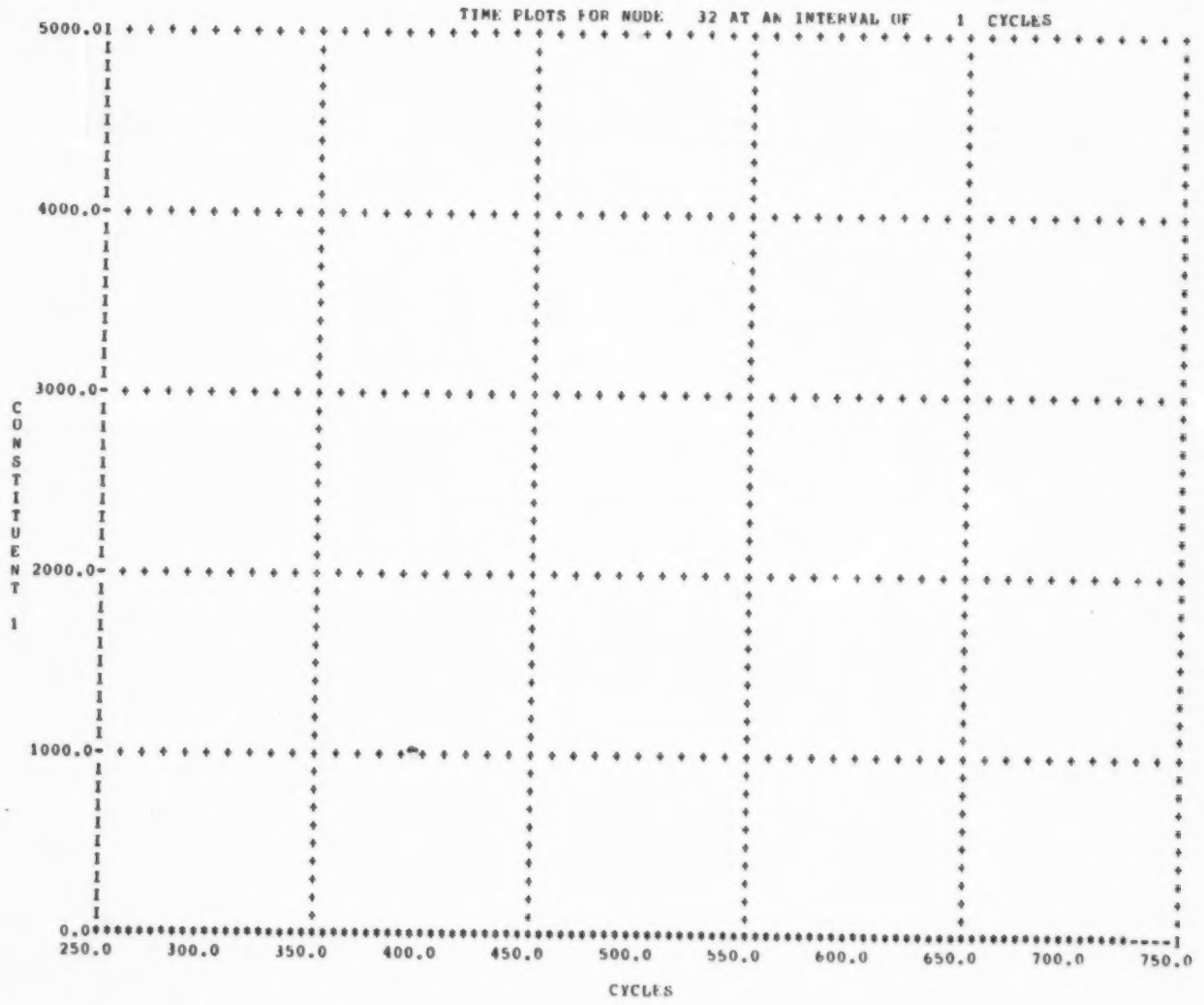

TIME PLOTS FOR NODE 20 AT AN INTERVAL OF 25 CYCLES
5000.0
4000.0
3000.0
2000.0
1000.0
0.0
CONSTITUENT 1
0.0
80.0
160.0
240.0
320.0
400.0
480.0
560.0
640.0
720.0
800.0
CYCLES


TIME PLOTS FOR NODE 20 AT AN INTERVAL OF 1 CYCLES
5000.0
4000.0
3000.0
2000.0
1000.0
0.0
CONSTITUENT 1
250.0
300.0
350.0
400.0
450.0
500.0
550.0
600.0
650.0
700.0
750.0
CYCLES


TIME PLOTS FOR NODE 25 AT AN INTERVAL OF 25 CYCLES
5000.0
4000.0
3000.0
2000.0
1000.0
0.0
CONSTITUENT I
0.0
80.0
160.0
240.0
320.0
400.0
480.0
560.0
640.0
720.0
800.0
CYCLES


TIME PLOTS FOR NODE 25 AT AN INTERVAL OF 1 CYCLES
5000.0
4000.0
3000.0
2000.0
1000.0
0.0
CONSTITUENT 1
250.0
300.0
350.0
400.0
450.0
500.0
550.0
600.0
650.0
700.0
750.0
CYCLES


TIME PLOTS FOR NODE 32 AT AN INTERVAL OF 25 CYCLES
5000.0
4000.0
3000.0
2000.0
1000.0
0.0
CONSTITUENT I
0.0
80.0
160.0
240.0
320.0
400.0
480.0
560.0
640.0
720.0
800.0
CYCLES


TIME PLOTS FOR NODE 32 AT AN INTERVAL OF 1 CYCLES
5000.0
4000.0
3000.0
2000.0
1000.0
0.0
CONSTITUENT 1
250.0
300.0
350.0
400.0
450.0
500.0
550.0
600.0
650.0
700.0
750.0
CYCLES

A.4 DYE - TEST CASE OUTPUT LISTING #1

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*
*****************************************************************************************************************************
                    SECTION 2.1              SET PROGRAM CONTROL OPTIONS
*
*****************************************************************************************************************************


DELAWARE ESTUARY (INCLUDING C&D CANAL) HYDRAULIC MODEL ** (76 JUNCTIONS)                    ENVIRONMENTAL PROTECTION AGENCY
DELAWARE FLOW = 3900 CFS ** SCHUYLKILL FLOW =  750 CFS  TAPE FP5231.FILE 6                  DYNAMIC WATER QUALITY MODEL
DELAWARE ESTUARY 1-D NETWORK, DYE STUDY PERIOD 1. DELAWARE R FLOW = 3900 CFS
                 SIMULATION PERIOD : JULY 22 - 31 , 1974

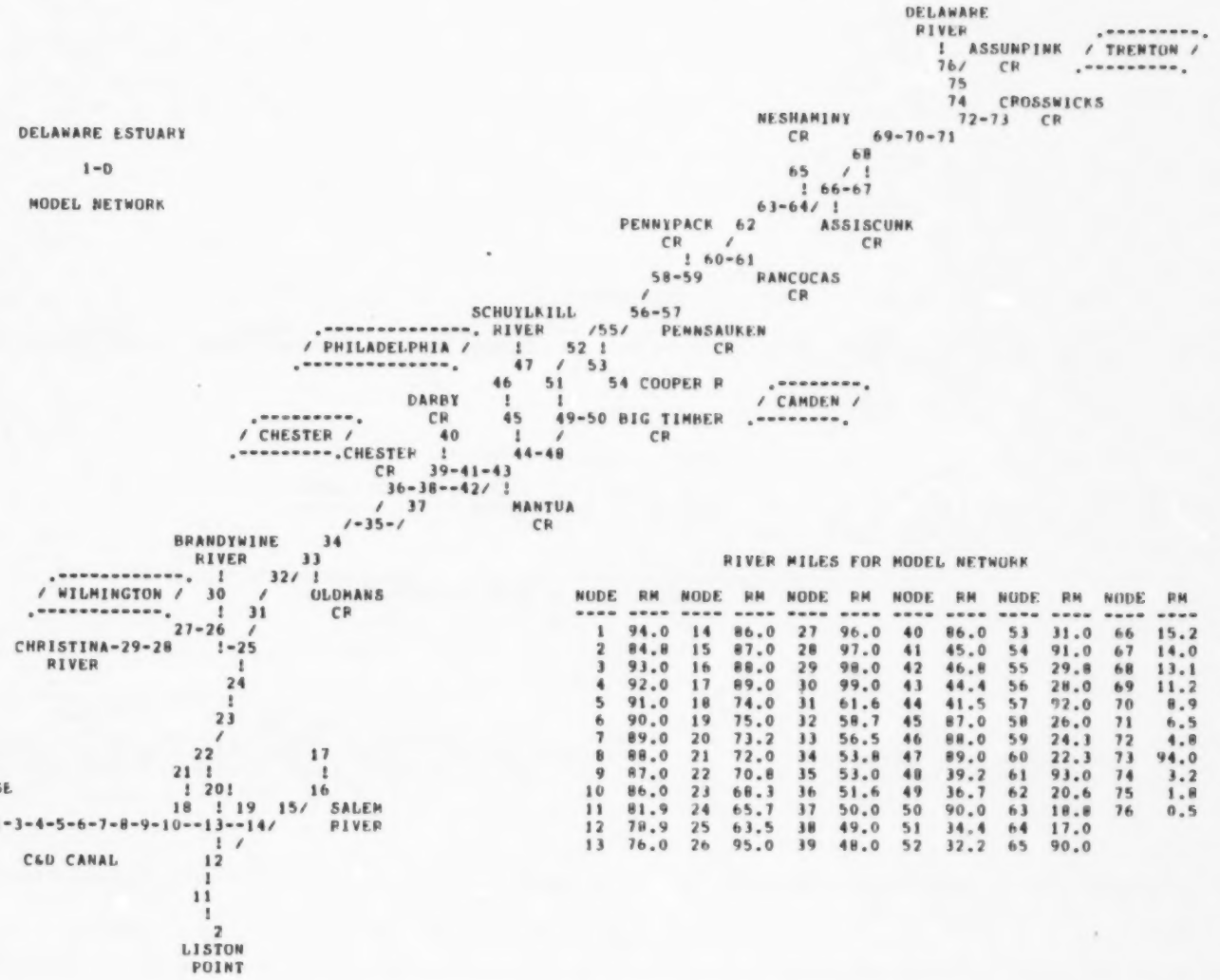

                              THIS SIMULATION BEGINS AT 12.00 HOURS
                       SUNRISE AND SUNSET OCCUR AT  6.00 AND 18.00 HOURS,RESPECTIVELY


                              ******** FROM HYDRAULICS PROGRAM ********
                              START CYCLE   STOP CYCLE    TIME INTERVAL

                                  150          300        300.  SECONDS


STARTING CYCLE  INITIAL QUALITY  TOTAL QUALITY  DEPLETION CORRECT TIME INTERVAL IN  START OF  START OF  DURATION  END OF
ON HYD EXT TAPE      CYCLE          CYCLES          OPTION        QUALITY PROGRAM    FLOOD      EBB     OF FLOOD   EBB

     156               1             448             2            0.500 HOURS        18         4        11       17
```



RIVER MILES FOR MODEL NETWORK

NODE	RM	NODE	RM	NODE	RM	NODE	RM	NODE	RM	NODE	RM
1	94.0	14	86.0	27	96.0	40	86.0	53	31.0	66	15.2
2	84.8	15	87.0	28	97.0	41	45.0	54	91.0	67	14.0
3	93.0	16	88.0	29	98.0	42	46.8	55	29.8	68	13.1
4	92.0	17	89.0	30	99.0	43	44.4	56	28.0	69	11.2
5	91.0	18	74.0	31	61.6	44	41.5	57	92.0	70	8.9
6	90.0	19	75.0	32	58.7	45	87.0	58	26.0	71	6.5
7	89.0	20	73.2	33	56.5	46	88.0	59	24.3	72	4.8
8	88.0	21	72.0	34	53.8	47	89.0	60	22.3	73	94.0
9	87.0	22	70.8	35	53.0	48	39.2	61	93.0	74	3.2
10	86.0	23	68.3	36	51.6	49	36.7	62	20.6	75	1.8
11	81.9	24	65.7	37	50.0	50	90.0	63	18.8	76	0.5
12	78.9	25	63.5	38	49.0	51	34.4	64	17.0		
13	76.0	26	95.0	39	48.0	52	32.2	65	90.0		

THE FOLLOWING 4 JUNCTIONS HAVE TIME PLOTS

JUNCTION	STARTING CYCLE	ENDING CYCLE	CYCLE INTERVAL (1=PLOT 0=NO PLOT)	CON1	CON2	CON3	CON4	CON5
60	7	447	25	1	0	0	0	0
60	7	447	1	1	0	0	0	0
55	7	447	25	1	0	0	0	0
55	7	447	1	1	0	0	0	0

```
*
*****************************************************************************************************************************
                    SECTION 2.2          DEFINE WATER QUALITY CONSTITUENTS
*
*****************************************************************************************************************************

                                        THIS RUN CONSIDERS 1 CONSTITUENTS


                                          CONSTITUENT 1 IS DYE (UG/L)


                          ***** TABLE OF TRANSFER COEFFICIENTS AND FUNCTION OPERATORS *****
CNST(K) CO(1,K) CO(2,K) CO(3,K) CO(4,K) CO(5,K) FUNC1  FUNC2  FUNC3  FUNC4  FUNC5  FUNC6  FUNC7  FUNC8  FUNC9  FUNC10 FUNC11 FUNC12

  1      -1.00    0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0


                    THE TEMPERATURE FROM CYCLE    1 THROUGH CYCLE 2400 IS 20.0 DEGREES C
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TABLE OF DECAY RATES (AT 20. C)

SIMULATION PERIOD : JULY 22 - 31 , 1974

CONSTITUENT 1 IS DYE (UG/L)

	******** PRIMARY DECAY RATES 1/DAY (BASE E) *******					SECONDARY DECAY 1/DAY	
NODE	CONST1	CONST2	CONST3	CONST4	CONST5	CONST6	CONST7
1	0.020	0.0	0.0	0.0	0.0	0.0	0.0
2	0.020	0.0	0.0	0.0	0.0	0.0	0.0
3	0.020	0.0	0.0	0.0	0.0	0.0	0.0
4	0.020	0.0	0.0	0.0	0.0	0.0	0.0
5	0.020	0.0	0.0	0.0	0.0	0.0	0.0
6	0.020	0.0	0.0	0.0	0.0	0.0	0.0
7	0.020	0.0	0.0	0.0	0.0	0.0	0.0
8	0.020	0.0	0.0	0.0	0.0	0.0	0.0
9	0.020	0.0	0.0	0.0	0.0	0.0	0.0
10	0.020	0.0	0.0	0.0	0.0	0.0	0.0
11	0.020	0.0	0.0	0.0	0.0	0.0	0.0
12	0.020	0.0	0.0	0.0	0.0	0.0	0.0
13	0.020	0.0	0.0	0.0	0.0	0.0	0.0
14	0.020	0.0	0.0	0.0	0.0	0.0	0.0
15	0.020	0.0	0.0	0.0	0.0	0.0	0.0
16	0.020	0.0	0.0	0.0	0.0	0.0	0.0
17	0.020	0.0	0.0	0.0	0.0	0.0	0.0
18	0.020	0.0	0.0	0.0	0.0	0.0	0.0
19	0.020	0.0	0.0	0.0	0.0	0.0	0.0
20	0.020	0.0	0.0	0.0	0.0	0.0	0.0
21	0.020	0.0	0.0	0.0	0.0	0.0	0.0
22	0.020	0.0	0.0	0.0	0.0	0.0	0.0
23	0.020	0.0	0.0	0.0	0.0	0.0	0.0
24	0.020	0.0	0.0	0.0	0.0	0.0	0.0
25	0.020	0.0	0.0	0.0	0.0	0.0	0.0
26	0.020	0.0	0.0	0.0	0.0	0.0	0.0
27	0.020	0.0	0.0	0.0	0.0	0.0	0.0
28	0.020	0.0	0.0	0.0	0.0	0.0	0.0
29	0.020	0.0	0.0	0.0	0.0	0.0	0.0
30	0.020	0.0	0.0	0.0	0.0	0.0	0.0
31	0.020	0.0	0.0	0.0	0.0	0.0	0.0
32	0.020	0.0	0.0	0.0	0.0	0.0	0.0
33	0.020	0.0	0.0	0.0	0.0	0.0	0.0
34	0.020	0.0	0.0	0.0	0.0	0.0	0.0
35	0.020	0.0	0.0	0.0	0.0	0.0	0.0
36	0.020	0.0	0.0	0.0	0.0	0.0	0.0
37	0.020	0.0	0.0	0.0	0.0	0.0	0.0
38	0.020	0.0	0.0	0.0	0.0	0.0	0.0
39	0.020	0.0	0.0	0.0	0.0	0.0	0.0
40	0.020	0.0	0.0	0.0	0.0	0.0	0.0
41	0.020	0.0	0.0	0.0	0.0	0.0	0.0
42	0.020	0.0	0.0	0.0	0.0	0.0	0.0

43	0.020	0.0	0.0	0.0	0.0	0.0	0.0
44	0.020	0.0	0.0	0.0	0.0	0.0	0.0
45	0.020	0.0	0.0	0.0	0.0	0.0	0.0
46	0.020	0.0	0.0	0.0	0.0	0.0	0.0
47	0.020	0.0	0.0	0.0	0.0	0.0	0.0
48	0.020	0.0	0.0	0.0	0.0	0.0	0.0
49	0.020	0.0	0.0	0.0	0.0	0.0	0.0
50	0.020	0.0	0.0	0.0	0.0	0.0	0.0
51	0.020	0.0	0.0	0.0	0.0	0.0	0.0
52	0.020	0.0	0.0	0.0	0.0	0.0	0.0
53	0.020	0.0	0.0	0.0	0.0	0.0	0.0
54	0.020	0.0	0.0	0.0	0.0	0.0	0.0
55	0.020	0.0	0.0	0.0	0.0	0.0	0.0
56	0.020	0.0	0.0	0.0	0.0	0.0	0.0
57	0.020	0.0	0.0	0.0	0.0	0.0	0.0
58	0.020	0.0	0.0	0.0	0.0	0.0	0.0
59	0.020	0.0	0.0	0.0	0.0	0.0	0.0
60	0.020	0.0	0.0	0.0	0.0	0.0	0.0
61	0.020	0.0	0.0	0.0	0.0	0.0	0.0
62	0.020	0.0	0.0	0.0	0.0	0.0	0.0
63	0.020	0.0	0.0	0.0	0.0	0.0	0.0
64	0.020	0.0	0.0	0.0	0.0	0.0	0.0
65	0.020	0.0	0.0	0.0	0.0	0.0	0.0
66	0.020	0.0	0.0	0.0	0.0	0.0	0.0
67	0.020	0.0	0.0	0.0	0.0	0.0	0.0
68	0.020	0.0	0.0	0.0	0.0	0.0	0.0
69	0.020	0.0	0.0	0.0	0.0	0.0	0.0
70	0.020	0.0	0.0	0.0	0.0	0.0	0.0
71	0.020	0.0	0.0	0.0	0.0	0.0	0.0
72	0.020	0.0	0.0	0.0	0.0	0.0	0.0
73	0.020	0.0	0.0	0.0	0.0	0.0	0.0
74	0.020	0.0	0.0	0.0	0.0	0.0	0.0
75	0.020	0.0	0.0	0.0	0.0	0.0	0.0
76	0.020	0.0	0.0	0.0	0.0	0.0	0.0

TEMPERATURE CORRECTION FACTORS , THETA

1.000	1.000	1.000	1.000	1.000	1.000	1.000

TABLE OF DECAY RATES (AT 20. C)

SIMULATION PERIOD : JULY 22 - 31 , 1974

CONSTITUENT 1 IS DYE (UG/L)

NODE	******* PRIMARY DECAY RATES 1/DAY (BASE E) *******					SECONDARY DECAY 1/DAY	
	CONST1	CONST2	CONST3	CONST4	CONST5	CONST0	CONST0
1	0.020	0.0	0.0	0.0	0.0	0.0	0.0
2	0.020	0.0	0.0	0.0	0.0	0.0	0.0
3	0.020	0.0	0.0	0.0	0.0	0.0	0.0
4	0.020	0.0	0.0	0.0	0.0	0.0	0.0
5	0.020	0.0	0.0	0.0	0.0	0.0	0.0
6	0.020	0.0	0.0	0.0	0.0	0.0	0.0
7	0.020	0.0	0.0	0.0	0.0	0.0	0.0
8	0.020	0.0	0.0	0.0	0.0	0.0	0.0
9	0.020	0.0	0.0	0.0	0.0	0.0	0.0
10	0.020	0.0	0.0	0.0	0.0	0.0	0.0
11	0.020	0.0	0.0	0.0	0.0	0.0	0.0
12	0.020	0.0	0.0	0.0	0.0	0.0	0.0
13	0.020	0.0	0.0	0.0	0.0	0.0	0.0
14	0.020	0.0	0.0	0.0	0.0	0.0	0.0
15	0.020	0.0	0.0	0.0	0.0	0.0	0.0
16	0.020	0.0	0.0	0.0	0.0	0.0	0.0
17	0.020	0.0	0.0	0.0	0.0	0.0	0.0
18	0.020	0.0	0.0	0.0	0.0	0.0	0.0
19	0.020	0.0	0.0	0.0	0.0	0.0	0.0
20	0.020	0.0	0.0	0.0	0.0	0.0	0.0
21	0.020	0.0	0.0	0.0	0.0	0.0	0.0
22	0.020	0.0	0.0	0.0	0.0	0.0	0.0
23	0.020	0.0	0.0	0.0	0.0	0.0	0.0
24	0.020	0.0	0.0	0.0	0.0	0.0	0.0
25	0.020	0.0	0.0	0.0	0.0	0.0	0.0
26	0.020	0.0	0.0	0.0	0.0	0.0	0.0
27	0.020	0.0	0.0	0.0	0.0	0.0	0.0
28	0.020	0.0	0.0	0.0	0.0	0.0	0.0
29	0.020	0.0	0.0	0.0	0.0	0.0	0.0
30	0.020	0.0	0.0	0.0	0.0	0.0	0.0
31	0.020	0.0	0.0	0.0	0.0	0.0	0.0
32	0.020	0.0	0.0	0.0	0.0	0.0	0.0
33	0.020	0.0	0.0	0.0	0.0	0.0	0.0
34	0.020	0.0	0.0	0.0	0.0	0.0	0.0
35	0.020	0.0	0.0	0.0	0.0	0.0	0.0
36	0.020	0.0	0.0	0.0	0.0	0.0	0.0
37	0.020	0.0	0.0	0.0	0.0	0.0	0.0
38	0.020	0.0	0.0	0.0	0.0	0.0	0.0
39	0.020	0.0	0.0	0.0	0.0	0.0	0.0
40	0.020	0.0	0.0	0.0	0.0	0.0	0.0
41	0.020	0.0	0.0	0.0	0.0	0.0	0.0
42	0.020	0.0	0.0	0.0	0.0	0.0	0.0

43	0.020	0.0	0.0	0.0	0.0	0.0	0.0
44	0.020	0.0	0.0	0.0	0.0	0.0	0.0
45	0.020	0.0	0.0	0.0	0.0	0.0	0.0
46	0.020	0.0	0.0	0.0	0.0	0.0	0.0
47	0.020	0.0	0.0	0.0	0.0	0.0	0.0
48	0.020	0.0	0.0	0.0	0.0	0.0	0.0
49	0.020	0.0	0.0	0.0	0.0	0.0	0.0
50	0.020	0.0	0.0	0.0	0.0	0.0	0.0
51	0.020	0.0	0.0	0.0	0.0	0.0	0.0
52	0.020	0.0	0.0	0.0	0.0	0.0	0.0
53	0.020	0.0	0.0	0.0	0.0	0.0	0.0
54	0.020	0.0	0.0	0.0	0.0	0.0	0.0
55	0.020	0.0	0.0	0.0	0.0	0.0	0.0
56	0.020	0.0	0.0	0.0	0.0	0.0	0.0
57	0.020	0.0	0.0	0.0	0.0	0.0	0.0
58	0.020	0.0	0.0	0.0	0.0	0.0	0.0
59	0.020	0.0	0.0	0.0	0.0	0.0	0.0
60	0.020	0.0	0.0	0.0	0.0	0.0	0.0
61	0.020	0.0	0.0	0.0	0.0	0.0	0.0
62	0.020	0.0	0.0	0.0	0.0	0.0	0.0
63	0.020	0.0	0.0	0.0	0.0	0.0	0.0
64	0.020	0.0	0.0	0.0	0.0	0.0	0.0
65	0.020	0.0	0.0	0.0	0.0	0.0	0.0
66	0.020	0.0	0.0	0.0	0.0	0.0	0.0
67	0.020	0.0	0.0	0.0	0.0	0.0	0.0
68	0.020	0.0	0.0	0.0	0.0	0.0	0.0
69	0.020	0.0	0.0	0.0	0.0	0.0	0.0
70	0.020	0.0	0.0	0.0	0.0	0.0	0.0
71	0.020	0.0	0.0	0.0	0.0	0.0	0.0
72	0.020	0.0	0.0	0.0	0.0	0.0	0.0
73	0.020	0.0	0.0	0.0	0.0	0.0	0.0
74	0.020	0.0	0.0	0.0	0.0	0.0	0.0
75	0.020	0.0	0.0	0.0	0.0	0.0	0.0
76	0.020	0.0	0.0	0.0	0.0	0.0	0.0

TEMPERATURE CORRECTION FACTORS , THETA

1.000	1.000	1.000	1.000	1.000	1.000	1.000

SECTION 2.3 SPECIFY WASTEWATER AND TRIBUTARY LOADS

SUMMARY OF POINT SOURCE INPUTS

SIMULATION PERIOD : JULY 22 - 31 , 1974

CONSTITUENT 1 IS DYE (UG/L)

MUNICIPAL AND INDUSTRIAL WASTEWATER AND TRIBUTARY INFLOW BY NODE

INPUT NODE	NAME OF DISCHARGE	TYPE OF DISCHARGE	******* FLOW ******* MGD	CFS	UNADJUSTED CONC (MG/L) + ADJ. FACTORS CONST1	CONST2	CONST3	CONST4	CONSI5	ADJUSTED INPUT LOADS - 1000 LB/DAY CONST1	CONST2	CONST3	CONST4	CONST5

***** VARYING WASTE LOADINGS *****

NODE 55 LOCATED IN ZONE 3 RECEIVES TYPE 1 LOADS FROM PHILA NE (MUN)

DISCHARGE PERIOD = 2400 CYCLES

START CYCLE	DURATION (CYCLES)	FLOW (CFS)	CONST1 (MG/L)	CONST2 (MG/L)	CONST3 (MG/L)	CONST4 (MG/L)	CONST5 (MG/L)
1	196	-254.97	24.80				
197	2204	-254.97	0.0				

*

****

SECTION 2.4 SPECIFY WATER QUALITY BOUNDARY CONDITIONS

****

SEAWARD BOUNDARY CONDITIONS

NODE 1 : COURTHOUSE PT , MARYLAND

' CIN1 ' PERIOD = 2400 CYCLES

START CYCLE	DURATION (CYCLES)	CONST1 (MG/L)	CONST2 (MG/L)	CONST3 (MG/L)	CONST4 (MG/L)	CONST5 (MG/L)
1	2400	0.0				

NODE 2 : LISTON PT , DELAWARE

' CINMAX ' PERIOD = 2400 CYCLES

START CYCLE	DURATION (CYCLES)	CONST1 (MG/L)	CONST2 (MG/L)	CONST3 (MG/L)	CONST4 (MG/L)	CONST5 (MG/L)
1	2400	0.0				

UPSTREAM BOUNDARY CONDITIONS

NODE 76 RECIEVES VARYING LOADS FROM DELAWARE (RIVR)

DISCHARGE PERIOD = 2400 CYCLES

START CYCLE	DURATION (CYCLES)	FLOW (CFS)	CONST1 (MG/L)	CONST2 (MG/L)	CONST3 (MG/L)	CONST4 (MG/L)	CONST5 (MG/L)
1	2400	-3900.00	0.0				

SECTION 2.5 PRINT HYDRAULIC INPUTS

JUNCTION HEAD AND HYD. RADIUS AND X-SECTIONAL AREA OF CHANNELS ARE AT MEAN TIDE **

CHANNEL DATA									JUNCTION DATA							
CHAN.	LENGTH	WIDTH	AREA	MANNING	NET FLOW	HYD. RADIUS	JUNC. AT ENDS		JUNC.	INFLOW	HEAD	CHANNELS ENTERING JUNCTION				
1	7000.	2400.	31041.	0.010	1912.28	12.9	1	3	1	0.0	0.10	1	0	0	0	0
2	11000.	850.	24478.	0.010	1912.25	28.8	3	4	2	0.0	-0.07	9	0	0	0	0
3	11000.	650.	18646.	0.010	1912.22	28.7	4	5	3	0.0	0.10	1	2	0	0	0
4	11000.	600.	17093.	0.010	1912.22	28.5	5	6	4	0.0	0.10	2	3	0	0	0
5	11000.	600.	16916.	0.010	1912.22	28.2	6	7	5	0.0	0.10	3	4	0	0	0
6	11000.	600.	13766.	0.010	1912.21	22.9	7	8	6	0.0	0.10	4	5	0	0	0
7	11000.	600.	12381.	0.010	1912.16	20.6	8	9	7	0.0	0.10	5	6	0	0	0
8	15679.	600.	11035.	0.010	1912.13	18.4	9	10	8	0.0	0.10	6	7	0	0	0
9	14994.	12995.	212732.	0.010	-8267.95	16.4	2	11	9	0.0	0.10	7	8	0	0	0
10	14994.	11829.	182978.	0.010	-8268.04	15.5	11	12	10	0.0	0.08	8	12	0	0	0
11	14994.	7700.	119189.	0.010	-11744.06	15.5	12	13	11	0.0	-0.04	9	10	0	0	0
12	11995.	4500.	78096.	0.010	1912.04	17.4	10	13	12	0.0	0.01	10	11	13	0	0
13	19326.	1700.	11946.	0.010	3474.65	7.0	12	14	13	0.0	0.08	11	12	14	18	20
14	7330.	7600.	68837.	0.010	5870.88	9.1	13	14	14	0.0	0.09	13	14	15	19	0
15	8996.	1000.	8615.	0.015	-16.88	8.6	14	15	15	0.0	0.18	15	16	0	0	0
16	8996.	4332.	32701.	0.015	-16.56	7.5	15	16	16	0.0	0.18	16	17	0	0	0
17	8996.	5331.	40358.	0.015	-15.80	7.6	16	17	17	-15.0	0.18	17	0	0	0	0
18	13661.	3800.	53752.	0.010	8258.80	14.1	13	18	18	0.0	0.10	18	21	0	0	0
19	8996.	5600.	23791.	0.010	9362.25	4.2	14	19	19	0.0	0.13	19	22	0	0	0
20	13661.	3400.	70365.	0.010	-23963.29	20.7	13	20	20	0.0	0.13	20	22	24	0	0
21	10662.	6000.	45761.	0.010	8258.62	7.6	18	21	21	0.0	0.19	21	23	0	0	0
22	9663.	4900.	47962.	0.010	9361.95	9.8	19	20	22	0.0	0.20	23	24	25	0	0
23	10996.	7600.	98206.	0.010	8258.32	12.9	21	22	23	0.0	0.22	25	26	0	0	0
24	13994.	3900.	66834.	0.010	-14601.62	17.1	20	22	24	0.0	0.23	26	27	0	0	0
25	13661.	8996.	149701.	0.010	-6343.82	16.6	22	23	25	0.0	0.24	27	28	33	0	0
26	11995.	8274.	146591.	0.010	-6344.27	17.7	23	24	26	0.0	0.25	28	29	32	0	0
27	11995.	6942.	145614.	0.010	-6344.72	21.0	24	25	27	0.0	0.25	29	30	0	0	0
28	9330.	1000.	14312.	0.015	-780.15	14.3	25	26	28	0.0	0.24	30	31	0	0	0
29	9330.	722.	7491.	0.015	-262.20	10.4	26	27	29	-262.0	0.24	31	0	0	0	0
30	9330.	389.	3587.	0.015	-262.20	9.2	27	28	30	-518.0	0.27	32	0	0	0	0
31	9330.	278.	2283.	0.015	-262.14	8.2	28	29	31	0.0	0.26	33	34	0	0	0
32	9330.	389.	2231.	0.015	-517.97	5.7	26	30	32	0.0	0.29	34	35	0	0	0
33	11995.	8163.	147978.	0.016	-5565.14	18.1	25	31	33	0.0	0.32	35	36	0	0	0
34	11995.	7441.	128049.	0.016	-5565.73	17.2	31	32	34	-49.0	0.34	36	37	38	0	0
35	11995.	6997.	114127.	0.016	-5566.24	16.3	32	33	35	0.0	0.34	38	40	0	0	0
36	13328.	5720.	114753.	0.016	-5566.64	20.1	33	34	36	-83.0	0.36	37	39	0	0	0
37	11995.	4054.	90810.	0.020	-7000.09	22.4	34	36	37	0.0	0.38	40	41	0	0	0
38	10662.	3887.	63741.	0.020	1482.16	16.4	34	35	38	0.0	0.38	39	41	42	43	0
39	11995.	4332.	85787.	0.020	-6917.19	19.8	36	38	39	0.0	0.39	42	44	45	0	0
40	7330.	2443.	15593.	0.020	1482.06	6.4	35	37	40	-60.0	0.36	44	0	0	0	0
41	7330.	2100.	18372.	0.020	1482.03	8.7	37	38	41	0.0	0.41	45	46	0	0	0
42	6331.	2600.	29857.	0.020	590.30	11.5	38	39	42	0.0	0.40	43	47	0	0	0
43	11995.	4942.	92225.	0.020	-6025.57	18.7	38	42	43	-24.0	0.42	46	47	48	0	0
44	8996.	300.	1783.	0.020	-59.98	5.9	39	40	44	0.0	0.43	48	49	52	0	0
45	6331.	1944.	13284.	0.020	650.27	6.8	39	41	45	0.0	0.43	49	50	0	0	0
46	11995.	2388.	28643.	0.020	650.27	12.0	41	43	46	0.0	0.43	50	51	0	0	0
47	11995.	3499.	77735.	0.020	-6025.63	22.2	42	43	47	-750.0	0.43	51	0	0	0	0

48	14994.	3998.	89416.	0.020	-5351.27	22.4	43	44	48	0.0	0.44	52	53	0	0	0
49	10662.	750.	9167.	0.020	-751.47	12.2	44	45	49	0.0	0.45	53	54	55	0	0
50	10662.	611.	10164.	0.020	-751.10	16.6	45	46	50	0.0	0.44	54	0	0	0	0
51	10662.	555.	7296.	0.020	-750.42	13.1	46	47	51	0.0	0.45	55	56	0	0	0
52	11995.	3887.	85840.	0.020	-4599.58	22.1	44	48	52	0.0	0.45	56	57	59	0	0
53	11995.	2832.	65795.	0.020	-4599.59	23.2	48	49	53	0.0	0.46	57	58	60	0	0
54	8996.	167.	2106.	0.020	0.05	12.6	49	50	54	-32.0	0.45	58	0	0	0	0
55	11995.	2332.	65464.	0.020	-4599.84	28.1	49	51	55	-255.0	0.46	59	60	61	0	0
56	10329.	2888.	75966.	0.020	-4600.16	26.3	51	52	56	0.0	0.47	61	62	63	0	0
57	6331.	1400.	18961.	0.020	-311.13	13.5	52	53	57	-14.0	0.47	62	0	0	0	0
58	8996.	300.	2065.	0.020	-31.88	6.9	53	54	58	0.0	0.48	63	64	0	0	0
59	11995.	3165.	73732.	0.020	-4289.50	23.3	52	55	59	0.0	0.49	64	65	0	0	0
60	7997.	2499.	30353.	0.020	-279.42	12.1	53	55	60	0.0	0.50	65	66	67	0	0
61	9674.	3195.	65511.	0.020	-4314.67	20.5	55	56	61	-175.0	0.50	66	0	0	0	0
62	9007.	300.	3425.	0.020	-13.93	11.4	56	57	62	0.0	0.51	67	68	0	0	0
63	9674.	2474.	52646.	0.035	-4301.65	21.3	56	58	63	0.0	0.52	68	69	0	0	0
64	9674.	2752.	58074.	0.035	-4302.45	21.1	58	59	64	0.0	0.52	69	70	71	0	0
65	9674.	2419.	47015.	0.035	-4303.24	19.4	59	60	65	-160.0	0.52	70	0	0	0	0
66	9007.	600.	8180.	0.035	-174.75	13.6	60	61	66	0.0	0.52	71	72	73	0	0
67	9007.	2863.	48809.	0.035	-4129.09	17.0	60	62	67	0.0	0.52	73	74	0	0	0
68	9007.	2391.	43929.	0.035	-4129.36	18.4	62	63	68	0.0	0.53	72	74	75	0	0
69	9508.	1890.	38607.	0.035	-4129.66	20.4	63	64	69	0.0	0.53	75	76	0	0	0
70	6331.	334.	4564.	0.035	-159.78	13.7	64	65	70	0.0	0.54	76	77	0	0	0
71	9508.	1640.	37523.	0.035	-3970.52	22.9	64	66	71	0.0	0.55	77	78	0	0	0
72	11009.	1307.	31145.	0.035	-3144.93	23.8	66	68	72	0.0	0.57	78	79	80	0	0
73	7839.	862.	14151.	0.040	-826.42	16.4	66	67	73	-64.0	0.57	79	0	0	0	0
74	7839.	834.	13825.	0.040	-826.70	16.6	67	68	74	0.0	0.59	80	81	0	0	0
75	9674.	1362.	31311.	0.040	-3972.45	23.0	68	69	75	0.0	0.61	81	82	0	0	0
76	10842.	1334.	32159.	0.040	-3972.60	24.1	69	70	76	-3900.0	0.68	82	0	0	0	0
77	12009.	1418.	29084.	0.040	-3971.66	20.5	70	71								
78	9007.	1362.	22449.	0.040	-3969.69	16.5	71	72								
79	6005.	334.	3729.	0.040	-64.25	11.2	72	73								
80	7506.	1473.	21073.	0.040	-3903.59	14.3	72	74								
81	8000.	1168.	16562.	0.040	-3901.94	14.2	74	75								
82	8000.	862.	9275.	0.040	-3900.78	10.8	75	76								

SECTION 2.6 SPECIFY INITIAL WATER QUALITY CONDITIONS

WATER QUALITY DATA

JUNC.	INFLOW	FIRST CONSTITUENT INITIAL CONC.	FIRST CONSTITUENT INFLOW LOAD.	SECOND CONSTITUENT INITIAL CONC.	SECOND CONSTITUENT INFLOW LOAD.	THIRD CONSTITUENT INITIAL CONC.	THIRD CONSTITUENT INFLOW LOAD	FOURTH CONSTITUENT INITIAL CONC.	FOURTH CONSTITUENT INFLOW LOAD	FIFTH CONSTITUENT INITIAL CONC.	FIFTH CONSTITUENT INFLOW LOAD
1	0.0	0.0	0.0								
2	0.0	0.0	0.0								
3	0.0	0.0	0.0								
4	0.0	0.0	0.0								
5	0.0	0.0	0.0								
6	0.0	0.0	0.0								
7	0.0	0.0	0.0								
8	0.0	0.0	0.0								
9	0.0	0.0	0.0								
10	0.0	0.0	0.0								
11	0.0	0.0	0.0								
12	0.0	0.0	0.0								
13	0.0	0.0	0.0								
14	0.0	0.0	0.0								
15	0.0	0.0	0.0								
16	0.0	0.0	0.0								
17	0.0	0.0	0.0								
18	0.0	0.0	0.0								
19	0.0	0.0	0.0								
20	0.0	0.0	0.0								
21	0.0	0.0	0.0								
22	0.0	0.0	0.0								
23	0.0	0.0	0.0								
24	0.0	0.0	0.0								
25	0.0	0.0	0.0								
26	0.0	0.0	0.0								
27	0.0	0.0	0.0								
28	0.0	0.0	0.0								
29	0.0	0.0	0.0								
30	0.0	0.0	0.0								
31	0.0	0.0	0.0								
32	0.0	0.0	0.0								
33	0.0	0.0	0.0								
34	0.0	0.0	0.0								
35	0.0	0.0	0.0								
36	0.0	0.0	0.0								
37	0.0	0.0	0.0								
38	0.0	0.0	0.0								
39	0.0	0.0	0.0								
40	0.0	0.0	0.0								
41	0.0	0.0	0.0								
42	0.0	0.0	0.0								
43	0.0	0.0	0.0								

6293070.00

HIGH SLACK PREDICTIONS

JUNCTION NUMBER	HEAD (FT)	CONCENTRATION FACTORS 1ST. CONSTIT. (MGL)	2ND. CONSTIT. (MGL)	3RD. CONSTIT. (MGL)	4TH. CONSTIT. (MGL)	5TH. CONSTIT. (MGL)
		CYCLE 577	12 DAYS, 4.50 HOURS			
2	1.5904	0.00				
- 11	1.8325	0.00				
		CYCLE 578	12 DAYS, 5.00 HOURS			
12	1.4775	0.00				
13	1.8735	0.00				
- 20	2.1259	0.00				
		CYCLE 579	12 DAYS, 5.50 HOURS			
22	1.8641	0.00				
23	2.0806	0.00				
24	2.2608	0.00				
25	2.4318	0.00				
- 31	2.5808	0.00				
		CYCLE 580	12 DAYS, 6.00 HOURS			
32	2.1690	0.0				
33	2.3587	0.00				
34	2.5561	0.04				
36	2.7116	0.08				
- 38	2.8586	0.14				
		CYCLE 581	12 DAYS, 6.50 HOURS			
42	2.4548	0.19				
43	2.6389	0.23				
44	2.8642	0.24				
48	3.0215	0.23				
= 49	3.2049	0.20				
		CYCLE 582	12 DAYS, 7.00 HOURS			

44	0.0	0.0	0.0
45	0.0	0.0	0.0
46	0.0	0.0	0.0
47	0.0	0.0	0.0
48	0.0	0.0	0.0
49	0.0	0.0	0.0
50	0.0	0.0	0.0
51	0.0	0.0	0.0
52	0.0	0.0	0.0
53	0.0	0.0	0.0
54	0.0	0.0	0.0
55	0.0	0.0	0.0
56	0.0	0.0	0.0
57	0.0	0.0	0.0
58	0.0	0.0	0.0
59	0.0	0.0	0.0
60	0.0	0.0	0.0
61	0.0	0.0	0.0
62	0.0	0.0	0.0
63	0.0	0.0	0.0
64	0.0	0.0	0.0
65	0.0	0.0	0.0
66	0.0	0.0	0.0
67	0.0	0.0	0.0
68	0.0	0.0	0.0
69	0.0	0.0	0.0
70	0.0	0.0	0.0
71	0.0	0.0	0.0
72	0.0	0.0	0.0
73	0.0	0.0	0.0
74	0.0	0.0	0.0
75	0.0	0.0	0.0
76	0.0	0.0	0.0

SECTION 2.8 SET ADVECTIVE AND DISPERSIVE TRANSPORT FACTORS

TRANSPORT FACTORS

CHANNEL NUMBER	VARYING ADVECTION FLOOD TIDE	EBB TIDE	DIFFUSION FACTORS C4	(A:SQMI/D)
1	1.00	0.0	20.00	1.14
2	1.00	0.0	30.00	4.60
3	1.00	0.0	40.00	7.79
4	1.00	0.0	50.00	10.30
5	1.00	0.0	60.00	12.04
6	1.00	0.0	70.00	13.62
7	1.00	0.0	80.00	15.00
8	1.00	0.0	90.00	16.05
9	0.60	0.0	100.00	10.38
10	0.33	0.0	100.00	10.72
11	0.20	0.0	100.00	14.75
12	1.00	0.33	50.00	1.02
13	0.20	0.0	50.00	2.02
14	0.20	0.0	50.00	1.11
15	0.50	0.0	50.00	5.25
16	0.50	0.0	50.00	1.04
17	0.50	0.0	50.00	0.40
18	0.50	0.0	50.00	4.76
19	0.50	0.0	50.00	0.90
20	0.50	0.10	75.00	13.43
21	0.50	0.0	50.00	2.81
22	0.50	0.0	50.00	0.67
23	0.50	0.0	50.00	1.89
24	0.50	0.25	50.00	8.31
25	0.67	0.33	25.00	2.45
26	0.67	0.33	25.00	2.51
27	0.67	0.33	25.00	2.82
28	0.67	0.33	25.00	0.58
29	0.67	0.33	25.00	0.55
30	0.67	0.33	25.00	0.69
31	0.67	0.33	25.00	0.52
32	0.67	0.33	25.00	0.17
33	0.67	0.33	25.00	2.19
34	0.67	0.33	25.00	2.27
35	0.67	0.33	10.00	0.91
36	0.67	0.33	10.00	1.03
37	0.67	0.33	10.00	1.19
38	0.67	0.33	10.00	0.20
39	0.67	0.33	10.00	1.08
40	0.67	0.33	1.00	0.03
41	0.67	0.33	1.00	0.03
42	0.67	0.33	1.00	0.03
43	0.67	0.33	1.00	0.09
44	0.67	0.33	1.00	0.02

45	0.67	0.33	1.00	0.03
46	0.67	0.33	1.00	0.02
47	0.67	0.33	1.00	0.11
48	0.67	0.33	1.00	0.11
49	0.67	0.33	1.00	0.02
50	0.67	0.33	1.00	0.02
51	0.67	0.33	1.00	0.01
52	0.67	0.33	1.00	0.09
53	0.67	0.33	1.00	0.12
54	0.67	0.33	1.00	0.01
55	0.67	0.33	1.00	0.14
56	0.67	0.33	1.00	0.10
57	0.67	0.33	1.00	0.04
58	0.67	0.33	1.00	0.01
59	0.67	0.33	1.00	0.07
60	0.67	0.33	1.00	0.02
61	0.67	0.33	1.00	0.08
62	0.67	0.33	1.00	0.01
63	0.67	0.33	1.00	0.09
64	0.67	0.33	1.00	0.08
65	0.67	0.33	1.00	0.08
66	0.67	0.33	1.00	0.01
67	0.67	0.33	1.00	0.06
68	0.67	0.33	1.00	0.06
69	0.67	0.33	1.00	0.07
70	0.67	0.33	1.00	0.01
71	0.67	0.33	1.00	0.07
72	0.67	0.33	1.00	0.06
73	0.67	0.33	1.00	0.03
74	0.67	0.33	1.00	0.02
75	0.67	0.33	1.00	0.06
76	0.67	0.33	1.00	0.05
77	0.67	0.33	1.00	0.04
78	0.67	0.33	1.00	0.03
79	0.67	0.33	1.00	0.01
80	0.67	0.33	1.00	0.01
81	0.67	0.33	1.00	0.01
82	0.67	0.33	1.00	0.01

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                        SECTION 3.0  SIMULATE WATER QUALITY CONDITIONS (MAIN QUALITY LOOP)

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RESTART DECK TAPE WAS LAST WRITTEN AFTER CYCLE     1
HYDRAULIC CYCLE ON EXTRACT TAPE FOR RESTARTING =    162
NTAG =    3



        THE TOTAL MASS (TONS) FOR EACH CONSTITUENT AT CYCLE     1 IS AS FOLLOWS

             2647833856.00

        THE TOTAL MASS (TONS) DEPLETED FOR EACH CONSTITUENT AS OF CYCLE     1 IS AS FOLLOWS

                     0.0
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HIGH SLACK PREDICTIONS

JUNCTION NUMBER	HEAD (FT)	CONCENTRATION FACTORS 1ST. CONSTIT. (MGL)	2ND. CONSTIT. (MGL)	3RD. CONSTIT. (MGL)	4TH. CONSTIT. (MGL)	5TH. CONSTIT. (MGL)
		CYCLE 2	0 DAYS, 13.00 HOURS			
2	1.5517	0.0				
- 11	1.7950	0.0				
		CYCLE 3	0 DAYS, 13.50 HOURS			
12	1.4352	0.0				
13	1.8328	0.0				
- 20	2.0848	0.0				
		CYCLE 4	0 DAYS, 14.00 HOURS			
22	1.8192	0.0				
23	2.0352	0.0				
24	2.2147	0.0				
25	2.3848	0.0				
31	2.5318	0.0				
		CYCLE 5	0 DAYS, 14.50 HOURS			
32	2.1162	0.0				
33	2.3055	0.0				
34	2.5016	0.0				
36	2.6541	0.0				
- 38	2.7970	0.0				
		CYCLE 6	0 DAYS, 15.00 HOURS			
42	2.3863	0.0				
43	2.5665	0.0				
44	2.7859	0.0				
48	2.9355	0.0				
- 49	3.1071	0.0				
		CYCLE 7	0 DAYS, 15.50 HOURS			

51	2.7830	0.0	
52	2.9303	0.0	
55	3.0569	0.07	
56	3.1878	0.03	
58	3.3299	0.01	
59	3.4421	0.00	
- 60	3.5501	0.00	
	CYCLE 8		0 DAYS, 16.00 HOURS
62	3.3475	0.00	
63	3.5022	0.00	
64	3.6733	0.00	
66	3.8241	0.0	
68	3.9573	0.0	
69	4.0832	0.0	
70	4.1986	0.0	
71	4.3029	0.0	
- 72	4.3676	0.0	
	CYCLE 9		0 DAYS, 16.50 HOURS
74	4.1979	0.0	
75	4.2441	0.0	
76	4.2966	0.0	

LOW SLACK PREDICTIONS

JUNCTION NUMBER	HEAD (FT)	CONCENTRATION FACTORS 1ST. CONSTIT. (MGL)	2ND. CONSTIT. (MGL)	3RD. CONSTIT. (MGL)	4TH. CONSTIT. (MGL)	5TH. CONSTIT. (MGL)
		CYCLE 41	1 DAYS, 8.50 HOURS			
2	-0.9948	0.0				
11	-1.2324	0.0				
		CYCLE 42	1 DAYS, 9.00 HOURS			
12	-0.7077	0.0				
13	-1.1636	0.00				
20	-1.5315	0.00				
		CYCLE 43	1 DAYS, 9.50 HOURS			
22	-1.1918	0.00				
23	-1.4982	0.00				
24	-1.7643	0.00				
25	-2.0021	0.00				
		CYCLE 44	1 DAYS, 10.00 HOURS			
31	-1.3300	0.00				
32	-1.6016	0.00				
33	-1.8874	0.00				
34	-2.1279	0.00				
		CYCLE 45	1 DAYS, 10.50 HOURS			
36	-1.4431	0.00				
38	-1.7553	0.00				
42	-1.9793	0.00				
43	-2.1874	0.00				
		CYCLE 46	1 DAYS, 11.00 HOURS			
44	-1.6826	0.01				
48	-1.9328	0.05				
49	-2.1890	0.12				

- 51	-2.3727	0.20	
		CYCLE 47	1 DAYS, 11.50 HOURS
52	-1.7790	0.24	
55	-1.9878	0.17	
56	-2.1860	0.00	
58	-2.3583	0.02	
		CYCLE 48	1 DAYS, 12.00 HOURS
59	-1.6635	0.00	
60	-1.9439	0.00	
62	-2.1452	0.00	
63	-2.3037	0.00	
- 64	-2.4175	0.00	
		CYCLE 49	1 DAYS, 12.50 HOURS
66	-1.9120	0.00	
68	-2.1128	0.00	
69	-2.3080	0.00	
70	-2.4657	0.00	
- 71	-2.5639	0.0	
		CYCLE 50	1 DAYS, 13.00 HOURS
72	-2.1895	0.0	
74	-2.3128	0.0	

RESTART DECK TAPE WAS LAST WRITTEN AFTER CYCLE 51
HYDRAULIC CYCLE ON EXTRACT TAPE FOR RESTARTING = 162
NTAG = 3

THE TOTAL MASS (TONS) FOR EACH CONSTITUENT AT CYCLE 51 IS AS FOLLOWS

133641076736.00

THE TOTAL MASS (TONS) DEPLETED FOR EACH CONSTITUENT AS OF CYCLE 51 IS AS FOLLOWS

842013.13

CYCLE 51 1 DAYS, 13.50 HOURS

76	-1.3293	0.0

HIGH SLACK PREDICTIONS

JUNCTION NUMBER	HEAD (FT)	CONCENTRATION FACTORS 1ST. CONSTIT. (MGL)	2ND. CONSTIT. (MGL)	3RD. CONSTIT. (MGL)	4TH. CONSTIT. (MGL)	5TH. CONSTIT. (MGL)
		CYCLE 52	1 DAYS, 14.00 HOURS			
2	1.5517	0.0				
11	1.7950	0.0				
		CYCLE 53	1 DAYS, 14.50 HOURS			
12	1.4352	0.0				
13	1.8328	0.0				
20	2.0848	0.0				
		CYCLE 54	1 DAYS, 15.00 HOURS			
22	1.8192	0.00				
23	2.0352	0.00				
24	2.2147	0.0				
25	2.3848	0.00				
- 31	2.5318	0.00				
		CYCLE 55	1 DAYS, 15.50 HOURS			
32	2.1162	0.00				
33	2.3055	0.0				
34	2.5016	0.00				
36	2.6541	0.0				
- 38	2.7970	0.0				
		CYCLE 56	1 DAYS, 16.00 HOURS			
42	2.3863	0.0				
43	2.5665	0.00				
44	2.7859	0.00				
48	2.9355	0.00				
- 49	3.1071	0.0				
		CYCLE 57	1 DAYS, 16.50 HOURS			

51	2.7830	0.02	
52	2.9303	0.03	
55	3.0569	0.25	
56	3.1878	0.28	
58	3.3299	0.22	
59	3.4421	0.10	
60	3.5501	0.04	
	CYCLE 58		1 DAYS, 17.00 HOURS
62	3.3475	0.01	
63	3.5022	0.00	
64	3.6733	0.00	
66	3.8241	0.00	
68	3.9573	0.00	
69	4.0832	0.00	
70	4.1986	0.00	
71	4.3029	0.00	
72	4.3676	0.00	
	CYCLE 59		1 DAYS, 17.50 HOURS
74	4.1979	0.00	
75	4.2441	0.0	
76	4.2966	0.0	

LOW SLACK PREDICTIONS

JUNCTION NUMBER	HEAD (FT)	CONCENTRATION FACTORS 1ST. CONSTIT. (MGL)	2ND. CONSTIT. (MGL)	3RD. CONSTIT. (MGL)	4TH. CONSTIT. (MGL)	5TH. CONSTIT. (MGL)
		CYCLE 91	2 DAYS, 9.50 HOURS			
2	-0.9948	0.00				
- 11	-1.2324	0.00				
		CYCLE 92	2 DAYS, 10.00 HOURS			
12	-0.7077	0.00				
13	-1.1636	0.00				
- 20	-1.5315	0.00				
		CYCLE 93	2 DAYS, 10.50 HOURS			
22	-1.1918	0.00				
23	-1.4982	0.00				
24	-1.7643	0.00				
- 25	-2.0021	0.00				
		CYCLE 94	2 DAYS, 11.00 HOURS			
31	-1.3300	0.00				
32	-1.6016	0.00				
33	-1.8874	0.00				
- 34	-2.1279	0.00				
		CYCLE 95	2 DAYS, 11.50 HOURS			
36	-1.4431	0.00				
38	-1.7553	0.00				
42	-1.9793	0.01				
43	-2.1874	0.01				
		CYCLE 96	2 DAYS, 12.00 HOURS			
44	-1.6826	0.04				
48	-1.9328	0.14				
49	-2.1890	0.28				

- 51	-2.3727	0.40	
		CYCLE 97	2 DAYS, 12.50 HOURS
52	-1.7790	0.41	
55	-1.9878	0.26	
56	-2.1860	0.00	
- 58	-2.3583	0.03	
		CYCLE 98	2 DAYS, 13.00 HOURS
59	-1.6635	0.00	
60	-1.9439	0.00	
62	-2.1452	0.00	
63	-2.3037	0.00	
- 64	-2.4175	0.00	
		CYCLE 99	2 DAYS, 13.50 HOURS
66	-1.9120	0.0	
68	-2.1128	0.00	
69	-2.3080	0.00	
70	-2.4657	0.00	
- 71	-2.5639	0.00	
		CYCLE 100	2 DAYS, 14.00 HOURS
72	-2.1895	0.00	
74	-2.3128	0.0	

RESTART DECK TAPE WAS LAST WRITTEN AFTER CYCLE 101
HYDRAULIC CYCLE ON EXTRACT TAPE FOR RESTARTING = 162
NTAG = 3

THE TOTAL MASS (TONS) FOR EACH CONSTITUENT AT CYCLE 101 IS AS FOLLOWS

2619304181 76.00

THE TOTAL MASS (TONS) DEPLETED FOR EACH CONSTITUENT AS OF CYCLE 101 IS AS FOLLOWS

2538348.00

CYCLE 101 2 DAYS, 14.50 HOURS

76 -1.3293 0.0

HIGH SLACK PREDICTIONS

JUNCTION NUMBER	HEAD (FT)	CONCENTRATION FACTORS 1ST. CONSTIT. (MGL)	2ND. CONSTIT. (MGL)	3RD. CONSTIT. (MGL)	4TH. CONSTIT. (MGL)	5TH. CONSTIT. (MGL)
		CYCLE 102	2 DAYS, 15.00 HOURS			
2	1.5517	0.0				
- 11	1.7950	0.0				
		CYCLE 103	2 DAYS, 15.50 HOURS			
12	1.4352	0.0				
13	1.8328	0.0				
- 20	2.0848	0.00				
		CYCLE 104	2 DAYS, 16.00 HOURS			
22	1.8192	0.0				
23	2.0352	0.00				
24	2.2147	0.00				
25	2.3848	0.00				
- 31	2.5318	0.0				
		CYCLE 105	2 DAYS, 16.50 HOURS			
32	2.1162	0.00				
33	2.3055	0.00				
34	2.5016	0.00				
36	2.6541	0.00				
- 38	2.7970	0.00				
		CYCLE 106	2 DAYS, 17.00 HOURS			
42	2.3863	0.0				
43	2.5665	0.00				
44	2.7859	0.00				
48	2.9355	0.0				
- 49	3.1071	0.00				
		CYCLE 107	2 DAYS, 17.50 HOURS			

51	2.7830	0.09	
52	2.9303	0.15	
55	3.0569	0.43	
56	3.1878	0.47	
58	3.3299	0.34	
59	3.4421	0.16	
- 60	3.5501	0.06	
		CYCLE 108	2 DAYS, 18.00 HOURS
62	3.3475	0.02	
63	3.5022	0.01	
64	3.6733	0.00	
66	3.8241	0.00	
68	3.9573	0.00	
69	4.0832	0.00	
70	4.1986	0.00	
71	4.3029	0.00	
- 72	4.3676	0.00	
		CYCLE 109	2 DAYS, 18.50 HOURS
74	4.1979	0.0	
75	4.2441	0.0	
76	4.2966	0.0	

LOW SLACK PREDICTIONS

JUNCTION NUMBER	HEAD (FT)	CONCENTRATION FACTORS 1ST. CONSTIT. (MGL)	2ND. CONSTIT. (MGL)	3RD. CONSTIT. (MGL)	4TH. CONSTIT. (MGL)	5TH. CONSTIT. (MGL)
		CYCLE 141	3 DAYS, 10.50 HOURS			
2	-0.9948	0.00				
11	-1.2324	0.00				
		CYCLE 142	3 DAYS, 11.00 HOURS			
12	-0.7077	0.00				
13	-1.1636	0.00				
20	-1.5315	0.00				
		CYCLE 143	3 DAYS, 11.50 HOURS			
22	-1.1918	0.00				
23	-1.4982	0.00				
24	-1.7643	0.00				
25	-2.0021	0.00				
		CYCLE 144	3 DAYS, 12.00 HOURS			
31	-1.3300	0.00				
32	-1.6016	0.00				
33	-1.8874	0.00				
34	-2.1279	0.00				
		CYCLE 145	3 DAYS, 12.50 HOURS			
36	-1.4431	0.00				
38	-1.7553	0.01				
42	-1.9793	0.02				
43	-2.1874	0.04				
		CYCLE 146	3 DAYS, 13.00 HOURS			
44	-1.6826	0.10				
48	-1.9328	0.27				
49	-2.1890	0.44				

- 51	-2.3727	0.55	
		CYCLE 147	3 DAYS, 13.50 HOURS
52	-1.7790	0.52	
55	-1.9878	0.32	
56	-2.1860	0.01	
- 58	-2.3583	0.04	
		CYCLE 148	3 DAYS, 14.00 HOURS
59	-1.6635	0.00	
60	-1.9439	0.00	
62	-2.1452	0.00	
63	-2.3037	0.00	
- 64	-2.4175	0.00	
		CYCLE 149	3 DAYS, 14.50 HOURS
66	-1.9120	0.00	
68	-2.1128	0.00	
69	-2.3080	0.00	
70	-2.4657	0.00	
- 71	-2.5639	0.00	
		CYCLE 150	3 DAYS, 15.00 HOURS
72	-2.1895	0.00	
74	-2.3128	0.0	

RESTART DECK TAPE WAS LAST WRITTEN AFTER CYCLE 151
HYDRAULIC CYCLE ON EXTRACT TAPE FOR RESTARTING = 162
NTAG = 3

THE TOTAL MASS (TONS) FOR EACH CONSTITUENT AT CYCLE 151 IS AS FOLLOWS

387561947136.00

THE TOTAL MASS (TONS) DEPLETED FOR EACH CONSTITUENT AS OF CYCLE 151 IS AS FOLLOWS

4011791.00

CYCLE 151 3 DAYS, 15.50 HOURS

76 -1.3293 0.0

HIGH SLACK PREDICTIONS

JUNCTION NUMBER	HEAD (FT)	CONCENTRATION FACTORS 1ST. CONSTIT. (MGL)	2ND. CONSTIT. (MGL)	3RD. CONSTIT. (MGL)	4TH. CONSTIT. (MGL)	5TH. CONSTIT. (MGL)
		CYCLE 152	3 DAYS, 16.00 HOURS			
2	1.5517	0.0				
- 11	1.7950	0.0				
		CYCLE 153	3 DAYS, 16.50 HOURS			
12	1.4352	0.00				
13	1.8328	0.0				
- 20	2.0848	0.00				
		CYCLE 154	3 DAYS, 17.00 HOURS			
22	1.8192	0.00				
23	2.0352	0.0				
24	2.2147	0.00				
25	2.3848	0.00				
- 31	2.5318	0.0				
		CYCLE 155	3 DAYS, 17.50 HOURS			
32	2.1162	0.00				
33	2.3055	0.00				
34	2.5016	0.00				
36	2.6541	0.00				
- 38	2.7970	0.0				
		CYCLE 156	3 DAYS, 18.00 HOURS			
42	2.3863	0.0				
43	2.5665	0.0				
44	2.7859	0.0				
48	2.9355	0.01				
49	3.1071	0.04				
		CYCLE 157	3 DAYS, 18.50 HOURS			

51	2.7830	0.18	
52	2.9303	0.28	
55	3.0569	0.58	
56	3.1878	0.61	
58	3.3299	0.44	
59	3.4421	0.20	
60	3.5501	0.07	
	CYCLE 158		3 DAYS, 19.00 HOURS
62	3.3475	0.02	
63	3.5022	0.01	
64	3.6733	0.00	
66	3.8241	0.00	
68	3.9573	0.00	
69	4.0832	0.00	
70	4.1986	0.00	
71	4.3029	0.00	
72	4.3676	0.00	
	CYCLE 159		3 DAYS, 19.50 HOURS
74	4.1979	0.00	
75	4.2441	0.0	
76	4.2966	0.0	

LOW SLACK PREDICTIONS

JUNCTION NUMBER	HEAD (FT)	CONCENTRATION FACTORS 1ST. CONSTIT. (MGL)	2ND. CONSTIT. (MGL)	3RD. CONSTIT. (MGL)	4TH. CONSTIT. (MGL)	5TH. CONSTIT. (MGL)
		CYCLE 191	4 DAYS, 11.50 HOURS			
2	-0.9948	0.00				
- 11	-1.2324	0.00				
		CYCLE 192	4 DAYS, 12.00 HOURS			
12	-0.7077	0.00				
13	-1.1636	0.00				
- 20	-1.5315	0.00				
		CYCLE 193	4 DAYS, 12.50 HOURS			
22	-1.1918	0.00				
23	-1.4982	0.00				
24	-1.7643	0.00				
- 25	-2.0021	0.00				
		CYCLE 194	4 DAYS, 13.00 HOURS			
31	-1.3300	0.00				
32	-1.6016	0.00				
33	-1.8874	0.00				
- 34	-2.1279	0.00				
		CYCLE 195	4 DAYS, 13.50 HOURS			
36	-1.4431	0.01				
38	-1.7553	0.02				
42	-1.9793	0.05				
- 43	-2.1874	0.09				
		CYCLE 196	4 DAYS, 14.00 HOURS			
44	-1.6826	0.18				
48	-1.9328	0.40				
49	-2.1890	0.58				

51	-2.3727	0.67	
		CYCLE 197	4 DAYS, 14.50 HOURS
52	-1.7790	0.59	
55	-1.9878	0.34	
56	-2.1860	0.02	
58	-2.3583	0.04	
		CYCLE 198	4 DAYS, 15.00 HOURS
59	-1.6635	0.00	
60	-1.9439	0.00	
62	-2.1452	0.00	
63	-2.3037	0.00	
64	-2.4175	0.00	
		CYCLE 199	4 DAYS, 15.50 HOURS
66	-1.9120	0.00	
68	-2.1128	0.00	
69	-2.3080	0.00	
70	-2.4657	0.00	
71	-2.5639	0.00	
		CYCLE 200	4 DAYS, 16.00 HOURS
72	-2.1895	0.00	
74	-2.3128	0.0	

RESTART DECK TAPE WAS LAST WRITTEN AFTER CYCLE 201
HYDRAULIC CYCLE ON EXTRACT TAPE FOR RESTARTING = 162
NTAG = 3

THE TOTAL MASS (TONS) FOR EACH CONSTITUENT AT CYCLE 201 IS AS FOLLOWS

497364500480.00

THE TOTAL MASS (TONS) DEPLETED FOR EACH CONSTITUENT AS OF CYCLE 201 IS AS FOLLOWS

- 6019154.00

CYCLE 201 4 DAYS, 16.50 HOURS

76 -1.3293 0.0

HIGH SLACK PREDICTIONS

JUNCTION NUMBER	HEAD (FT)	CONCENTRATION FACTORS 1ST. CONSTIT. (MGL)	2ND. CONSTIT. (MGL)	3RD. CONSTIT. (MGL)	4TH. CONSTIT. (MGL)	5TH. CONSTIT. (MGL)
		CYCLE 202	4 DAYS, 17.00 HOURS			
2	1.5517	0.00				
- 11	1.7950	0.00				
		CYCLE 203	4 DAYS, 17.50 HOURS			
12	1.4352	0.00				
13	1.8328	0.0				
- 20	2.0848	0.00				
		CYCLE 204	4 DAYS, 18.00 HOURS			
22	1.8192	0.00				
23	2.0352	0.0				
24	2.2147	0.00				
25	2.3848	0.00				
- 31	2.5318	0.0				
		CYCLE 205	4 DAYS, 18.50 HOURS			
32	2.1162	0.00				
33	2.3055	0.00				
34	2.5016	0.00				
36	2.6541	0.0				
38	2.7970	0.0				
		CYCLE 206	4 DAYS, 19.00 HOURS			
42	2.3863	0.0				
43	2.5665	0.0				
44	2.7859	0.01				
48	2.9355	0.05				
- 49	3.1071	0.11				
		CYCLE 207	4 DAYS, 19.50 HOURS			

51	2.7830	0.28	
52	2.9303	0.44	
55	3.0569	0.63	
56	3.1878	0.65	
58	3.3299	0.45	
59	3.4421	0.21	
- 60	3.5501	0.08	
	CYCLE 208		4 DAYS, 20.00 HOURS
62	3.3475	0.03	
63	3.5022	0.01	
64	3.6733	0.00	
66	3.8241	0.00	
68	3.9573	0.00	
69	4.0832	0.00	
70	4.1986	0.00	
71	4.3029	0.00	
- 72	4.3676	0.00	
	CYCLE 209		4 DAYS, 20.50 HOURS
74	4.1979	0.00	
75	4.2441	0.0	
76	4.2966	0.0	

HIGH SLACK PREDICTIONS

JUNCTION NUMBER	HEAD (FT)	CONCENTRATION FACTORS 1ST. CONSTIT. (MGL)	2ND. CONSTIT. (MGL)	3RD. CONSTIT. (MGL)	4TH. CONSTIT. (MGL)	5TH. CONSTIT. (MGL)
		CYCLE 227	5 DAYS, 5.50 HOURS			
2	1.5517	0.0				
- 11	1.7950	0.00				
		CYCLE 228	5 DAYS, 6.00 HOURS			
12	1.4352	0.00				
13	1.8328	0.0				
- 20	2.0848	0.00				
		CYCLE 229	5 DAYS, 6.50 HOURS			
22	1.8192	0.00				
23	2.0352	0.0				
24	2.2147	0.00				
25	2.3848	0.00				
31	2.5318	0.0				
		CYCLE 230	5 DAYS, 7.00 HOURS			
32	2.1162	0.00				
33	2.3055	0.00				
34	2.5016	0.00				
36	2.6541	0.0				
- 38	2.7970	0.0				
		CYCLE 231	5 DAYS, 7.50 HOURS			
42	2.3863	0.0				
43	2.5665	0.0				
44	2.7859	0.02				
48	2.9355	0.07				
- 49	3.1071	0.16				
		CYCLE 232	5 DAYS, 8.00 HOURS			

51	2.7830	0.32	
52	2.9303	0.48	
55	3.0569	0.59	
56	3.1878	0.54	
58	3.3299	0.37	
59	3.4421	0.17	
- 60	3.5501	0.07	
	CYCLE 233		5 DAYS. 8.50 HOURS
62	3.3475	0.02	
63	3.5022	0.01	
64	3.6733	0.00	
66	3.8241	0.00	
68	3.9573	0.00	
69	4.0832	0.00	
70	4.1986	0.00	
71	4.3029	0.00	
- 72	4.3676	0.00	
	CYCLE 234		5 DAYS. 9.00 HOURS
74	4.1979	0.00	
75	4.2441	0.0	
76	4.2966	0.0	

RESTART DECK TAPE WAS LAST WRITTEN AFTER CYCLE 251
HYDRAULIC CYCLE ON EXTRACT TAPE FOR RESTARTING = 162
NTAG = 3

THE TOTAL MASS (TONS) FOR EACH CONSTITUENT AT CYCLE 251 IS AS FOLLOWS

4870792151O4.00

THE TOTAL MASS (TONS) DEPLETED FOR EACH CONSTITUENT AS OF CYCLE 251 IS AS FOLLOWS

7800294.00

RESTART DECK TAPE WAS LAST WRITTEN AFTER CYCLE 301
HYDRAULIC CYCLE ON EXTRACT TAPE FOR RESTARTING = 162
NTAG = 3

THE TOTAL MASS (TONS) FOR EACH CONSTITUENT AT CYCLE 301 IS AS FOLLOWS

477008691200.00

THE TOTAL MASS (TONS) DEPLETED FOR EACH CONSTITUENT AS OF CYCLE 301 IS AS FOLLOWS

10077062.00

HIGH SLACK PREDICTIONS

JUNCTION NUMBER	HEAD (FT)	CONCENTRATION FACTORS 1ST. CONSTIT. (MGL)	2ND. CONSTIT. (MGL)	3RD. CONSTIT. (MGL)	4TH. CONSTIT. (MGL)	5TH. CONSTIT. (MGL)
		CYCLE 327	7 DAYS, 7.50 HOURS			
2	1.5517	0.0				
- 11	1.7950	0.00				
		CYCLE 328	7 DAYS, 8.00 HOURS			
12	1.4352	0.00				
13	1.8328	0.00				
- 20	2.0848	0.00				
		CYCLE 329	7 DAYS, 8.50 HOURS			
22	1.8192	0.00				
23	2.0352	0.0				
24	2.2147	0.00				
25	2.3848	0.00				
- 31	2.5318	0.00				
		CYCLE 330	7 DAYS, 9.00 HOURS			
32	2.1162	0.00				
33	2.3055	0.00				
34	2.5016	0.00				
36	2.6541	0.0				
38	2.7970	0.0				
		CYCLE 331	7 DAYS, 9.50 HOURS			
42	2.3863	0.0				
43	2.5665	0.01				
44	2.7859	0.12				
48	2.9355	0.19				
- 49	3.1071	0.29				
		CYCLE 332	7 DAYS, 10.00 HOURS			

51	2.7830	0.38	
52	2.9303	0.43	
55	3.0569	0.39	
56	3.1878	0.30	
58	3.3299	0.19	
59	3.4421	0.09	
- 60	3.5501	0.04	
		CYCLE 333	7 DAYS, 10.50 HOURS
62	3.3475	0.01	
63	3.5022	0.00	
64	3.6733	0.00	
66	3.8241	0.00	
68	3.9573	0.00	
69	4.0832	0.00	
70	4.1986	0.00	
71	4.3029	0.00	
- 72	4.3676	0.00	
		CYCLE 334	7 DAYS, 11.00 HOURS
74	4.1979	0.00	
75	4.2441	0.0	
76	4.2966	0.0	

RESTART DECK TAPE WAS LAST WRITTEN AFTER CYCLE 351
HYDRAULIC CYCLE ON EXTRACT TAPE FOR RESTARTING = 162
NTAG = 3

THE TOTAL MASS (TONS) FOR EACH CONSTITUENT AT CYCLE 351 IS AS FOLLOWS

467148931072.00

THE TOTAL MASS (TONS) DEPLETED FOR EACH CONSTITUENT AS OF CYCLE 351 IS AS FOLLOWS

HIGH SLACK PREDICTIONS

JUNCTION NUMBER	HEAD (FT)	CONCENTRATION FACTORS 1ST. CONSTIT. (MGL)	2ND. CONSTIT. (MGL)	3RD. CONSTIT. (MGL)	4TH. CONSTIT. (MGL)	5TH. CONSTIT. (MGL)
		CYCLE 377	8 DAYS, 8.50 HOURS			
2	1.5517	0.0				
- 11	1.7950	0.00				
		CYCLE 378	8 DAYS, 9.00 HOURS			
12	1.4352	0.00				
13	1.8328	0.00				
- 20	2.0848	0.00				
		CYCLE 379	8 DAYS, 9.50 HOURS			
22	1.8192	0.00				
23	2.0352	0.0				
24	2.2147	0.00				
25	2.3848	0.00				
- 31	2.5318	0.00				
		CYCLE 380	8 DAYS, 10.00 HOURS			
32	2.1162	0.00				
33	2.3055	0.00				
34	2.5016	0.00				
36	2.6541	0.0				
38	2.7970	0.0				
		CYCLE 381	8 DAYS, 10.50 HOURS			
42	2.3863	0.0				
43	2.5665	0.05				
44	2.7859	0.16				
48	2.9355	0.23				
- 49	3.1071	0.31				
		CYCLE 382	8 DAYS, 11.00 HOURS			

51	2.7830	0.36	
52	2.9303	0.37	
55	3.0569	0.31	
56	3.1878	0.23	
58	3.3299	0.14	
59	3.4421	0.06	
- 60	3.5501	0.03	
	CYCLE 383		8 DAYS, 11.50 HOURS
62	3.3475	0.01	
63	3.5022	0.00	
64	3.6733	0.00	
66	3.8241	0.00	
68	3.9573	0.00	
69	4.0832	0.00	
70	4.1986	0.00	
71	4.3029	0.00	
- 72	4.3676	0.00	
	CYCLE 384		8 DAYS, 12.00 HOURS
74	4.1979	0.00	
75	4.2441	0.0	
76	4.2966	0.0	

RESTART DECK TAPE WAS LAST WRITTEN AFTER CYCLE 401
HYDRAULIC CYCLE ON EXTRACT TAPE FOR RESTARTING = 162
NTAG = 3

THE TOTAL MASS (TONS) FOR EACH CONSTITUENT AT CYCLE 401 IS AS FOLLOWS

457495347200.00

THE TOTAL MASS (TONS) DEPLETED FOR EACH CONSTITUENT AS OF CYCLE 401 IS AS FOLLOWS

14870658.00

HIGH SLACK PREDICTIONS

JUNCTION NUMBER	HEAD (FT)	CONCENTRATION FACTORS 1ST. CONSTIT. (MGL)	2ND. CONSTIT. (MGL)	3RD. CONSTIT. (MGL)	4TH. CONSTIT. (MGL)	5TH. CONSTIT. (MGL)
		CYCLE 427	9 DAYS, 9.50 HOURS			
2	1.5517	0.00				
- 11	1.7950	0.00				
		CYCLE 428	9 DAYS, 10.00 HOURS			
12	1.4352	0.00				
13	1.8328	0.00				
- 20	2.0848	0.00				
		CYCLE 429	9 DAYS, 10.50 HOURS			
22	1.8192	0.00				
23	2.0352	0.0				
24	2.2147	0.00				
25	2.3848	0.00				
- 31	2.5318	0.00				
		CYCLE 430	9 DAYS, 11.00 HOURS			
32	2.1162	0.00				
33	2.3055	0.00				
34	2.5016	0.00				
36	2.6541	0.0				
38	2.7970	0.00				
		CYCLE 431	9 DAYS, 11.50 HOURS			
42	2.3863	0.02				
43	2.5665	0.10				
44	2.7859	0.20				
48	2.9355	0.26				
- 49	3.1071	0.31				
		CYCLE 432	9 DAYS, 12.00 HOURS			

	51	2.7830	0.32
	52	2.9303	0.32
	55	3.0569	0.25
	56	3.1878	0.17
	58	3.3299	0.10
	59	3.4421	0.05
-	60	3.5501	0.02

CYCLE 433 9 DAYS, 12.50 HOURS

	62	3.3475	0.01
	63	3.5022	0.00
	64	3.6733	0.00
	66	3.8241	0.00
	68	3.9573	0.00
	69	4.0832	0.00
	70	4.1986	0.00
	71	4.3029	0.00
-	72	4.3676	0.00

CYCLE 434 9 DAYS, 13.00 HOURS

	74	4.1979	0.00
	75	4.2441	0.0
	76	4.2966	0.0

RESTART DECK TAPE WAS LAST WRITTEN AFTER CYCLE 448
HYDRAULIC CYCLE ON EXTRACT TAPE FOR RESTARTING = 294
NTAG = 0

THE TOTAL MASS (TONS) FOR EACH CONSTITUENT AT CYCLE 448 IS AS FOLLOWS

448604536832.00

THE TOTAL MASS (TONS) DEPLETED FOR EACH CONSTITUENT AS OF CYCLE 448 IS AS FOLLOWS

15773218.00

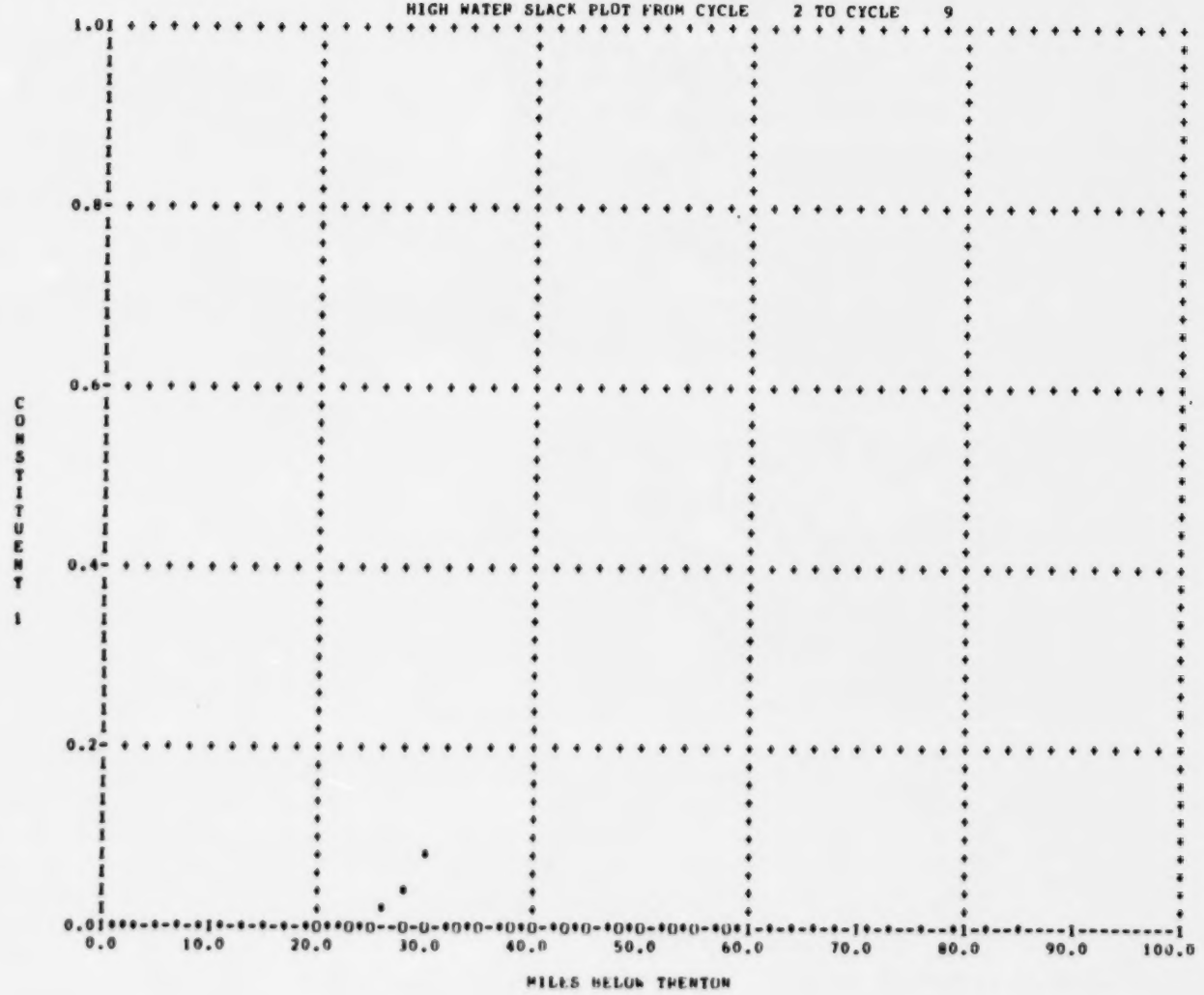
END OF QUALITY RUN. 448 CYCLES.

THE FOLLOWING DEPLETION CORRECTIONS (MG/L * CU FT) WERE ACCUMULATED FOR CONSTITUENT 1

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	4.	2.	0.	0.	0.	0.	0.	0.	5.
2.	8.	5.	0.	26.	0.	0.	0.	0.	0.
10.	0.	3436.	2428.	0.	3476.	2076.	11660.	0.	0.
239.	16994.	15361.	3658.	0.	109.	136.	1688.	4817.	0.
0.	765.	0.	25.	0.	0.	194.	0.	403.	11.
254.	6.	1.	1.	2.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.				

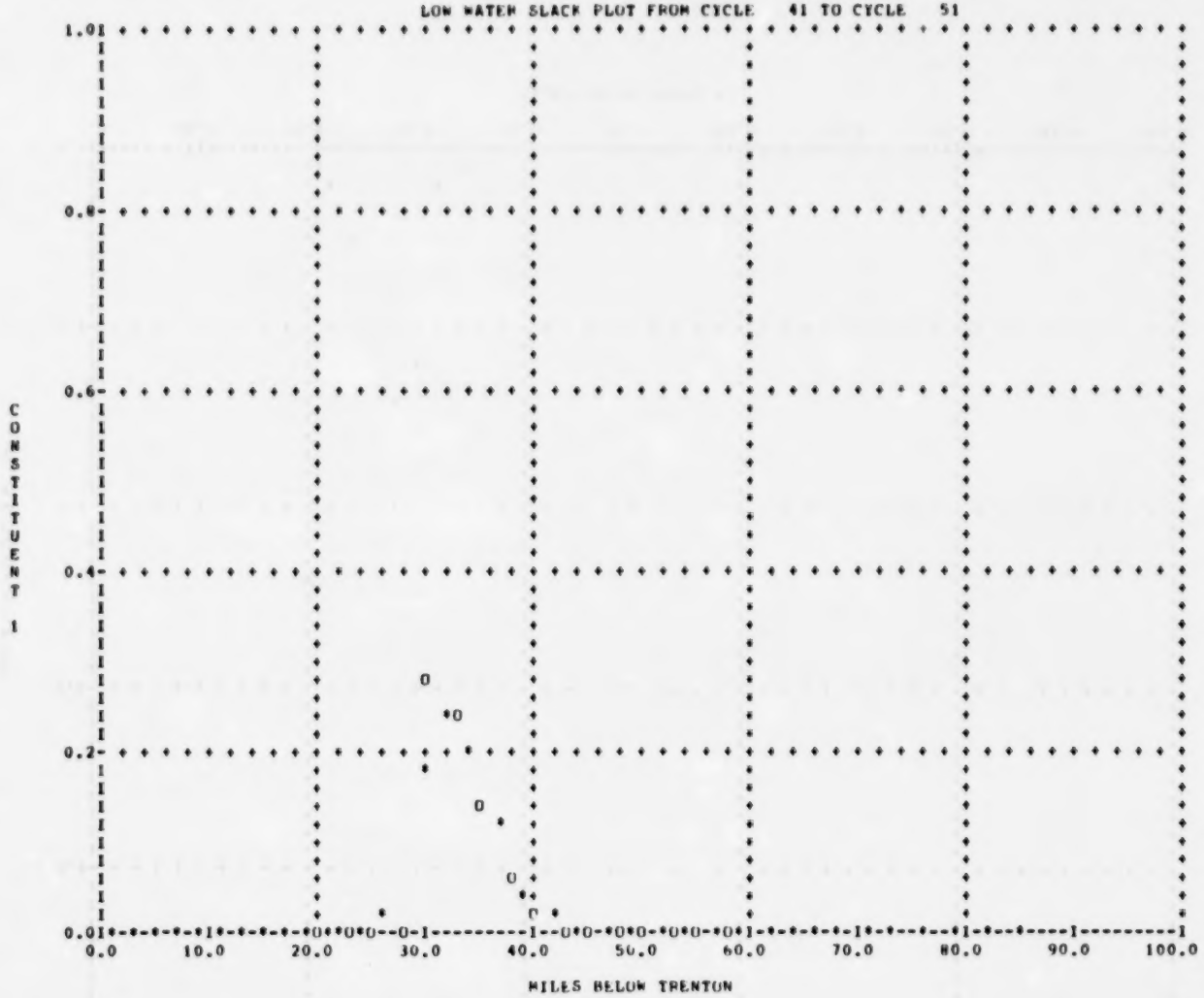
DELAWARE ESTUARY CENTER CHANNEL

HIGH WATER SLACK PLOT FROM CYCLE 2 TO CYCLE 9



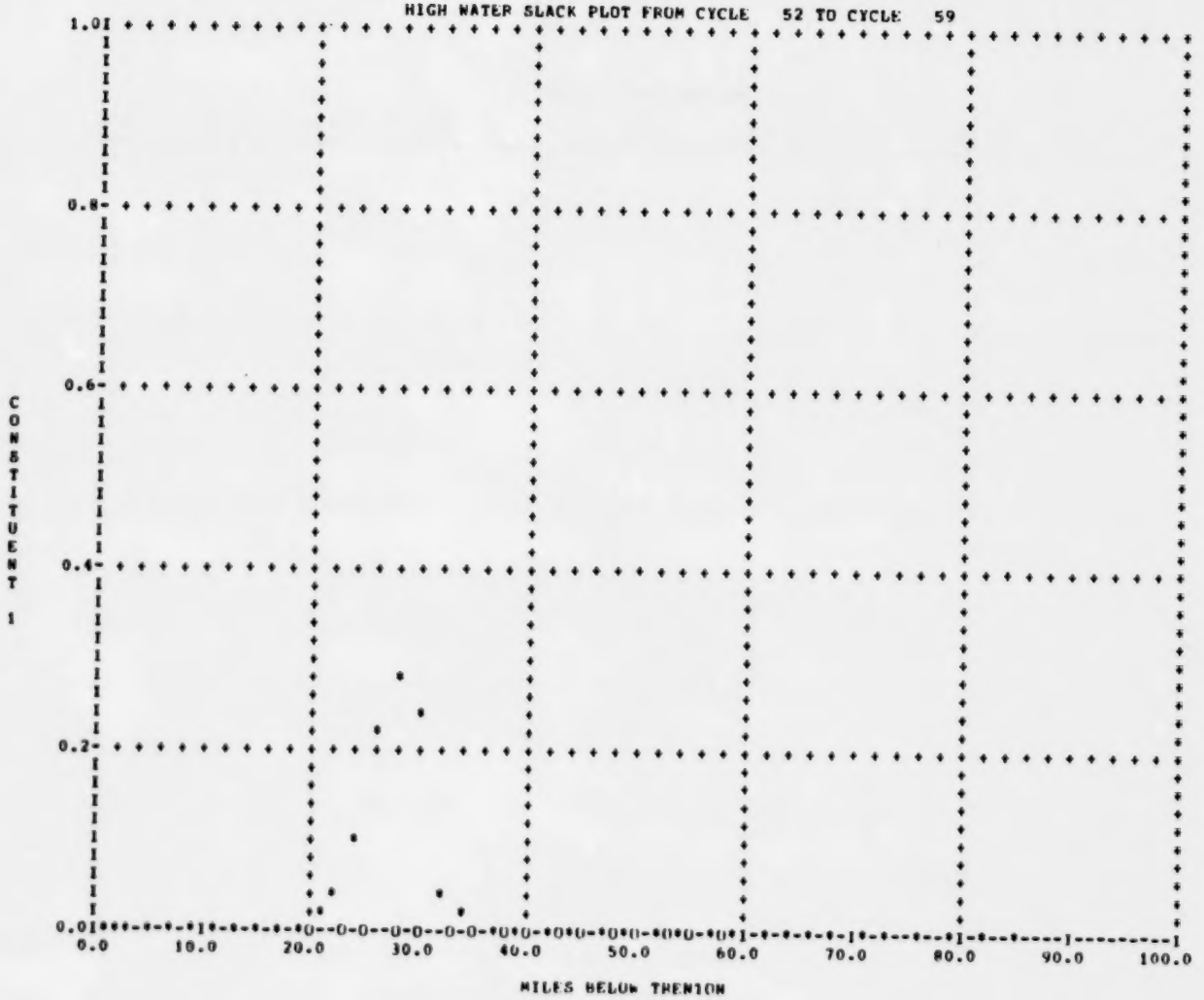
DELAWARE ESTUARY CENTER CHANNEL

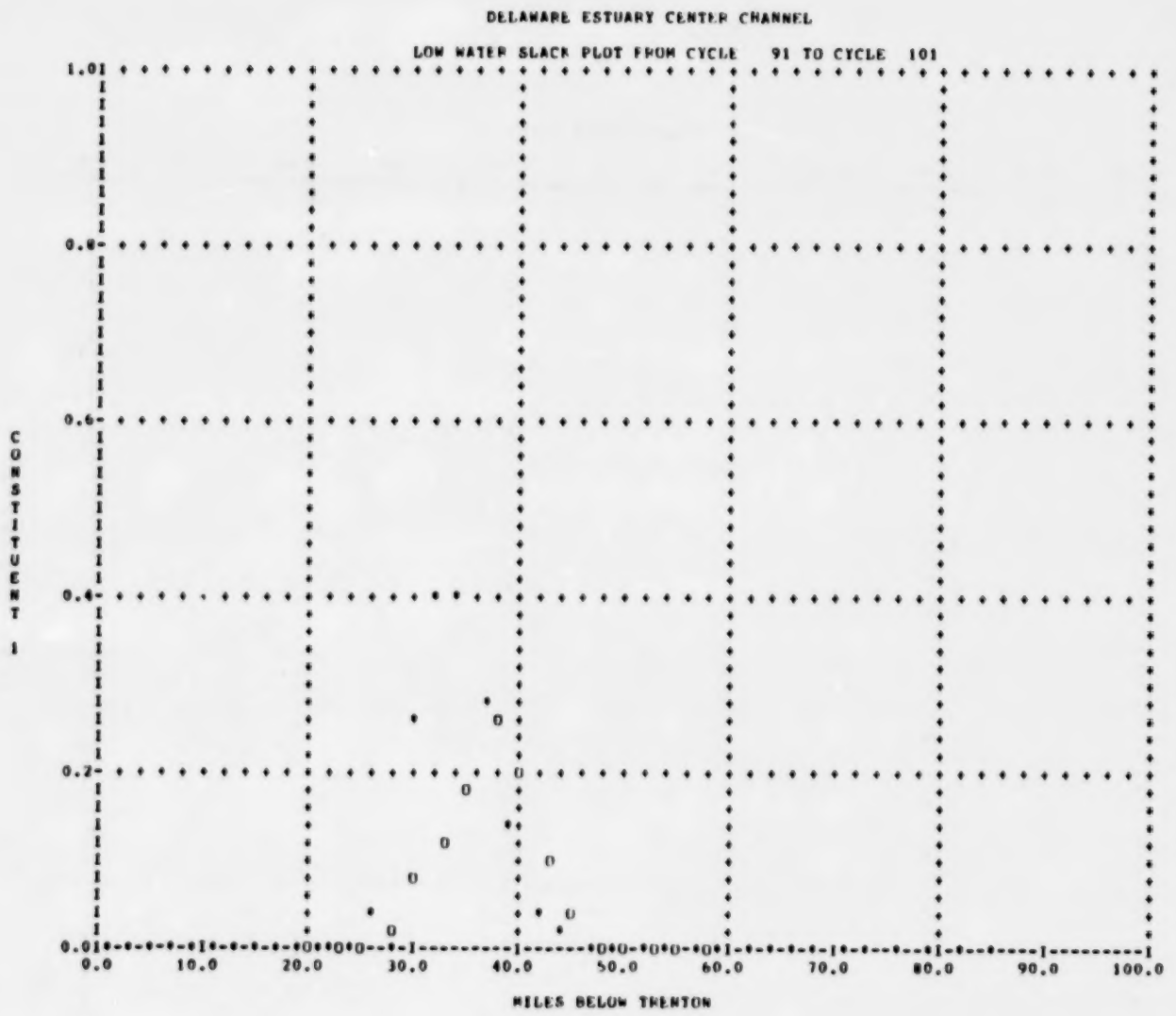
LOW WATER SLACK PLOT FROM CYCLE 41 TO CYCLE 51



DELAWARE ESTUARY CENTER CHANNEL

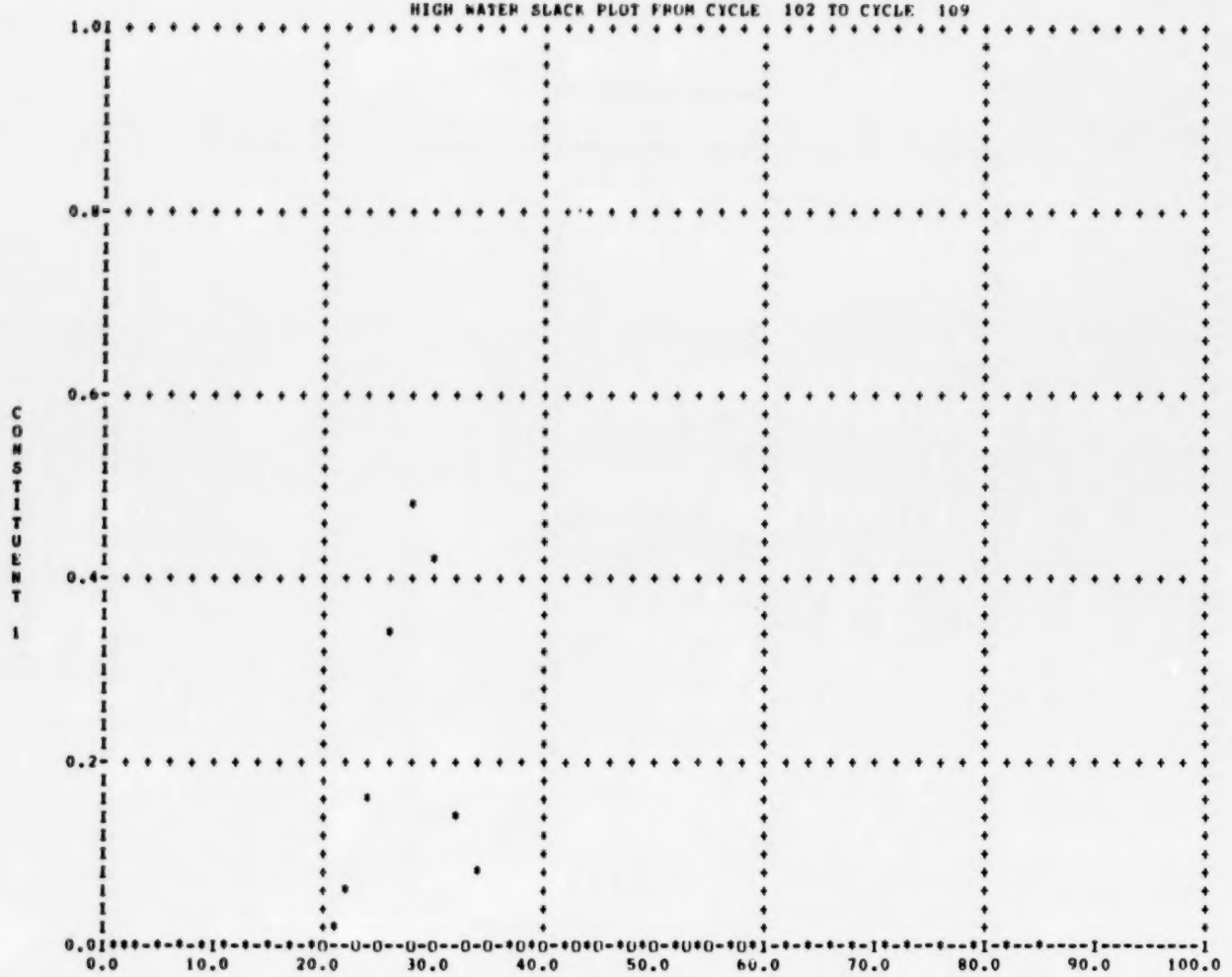
HIGH WATER SLACK PLOT FROM CYCLE 52 TO CYCLE 59




DELAWARE ESTUARY CENTER CHANNEL
LOW WATER SLACK PLOT FROM CYCLE 91 TO CYCLE 101
CONSTITUENT 1
1.0
0.8
0.6
0.4
0.2
0.0
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
MILES BELOW TRENTON

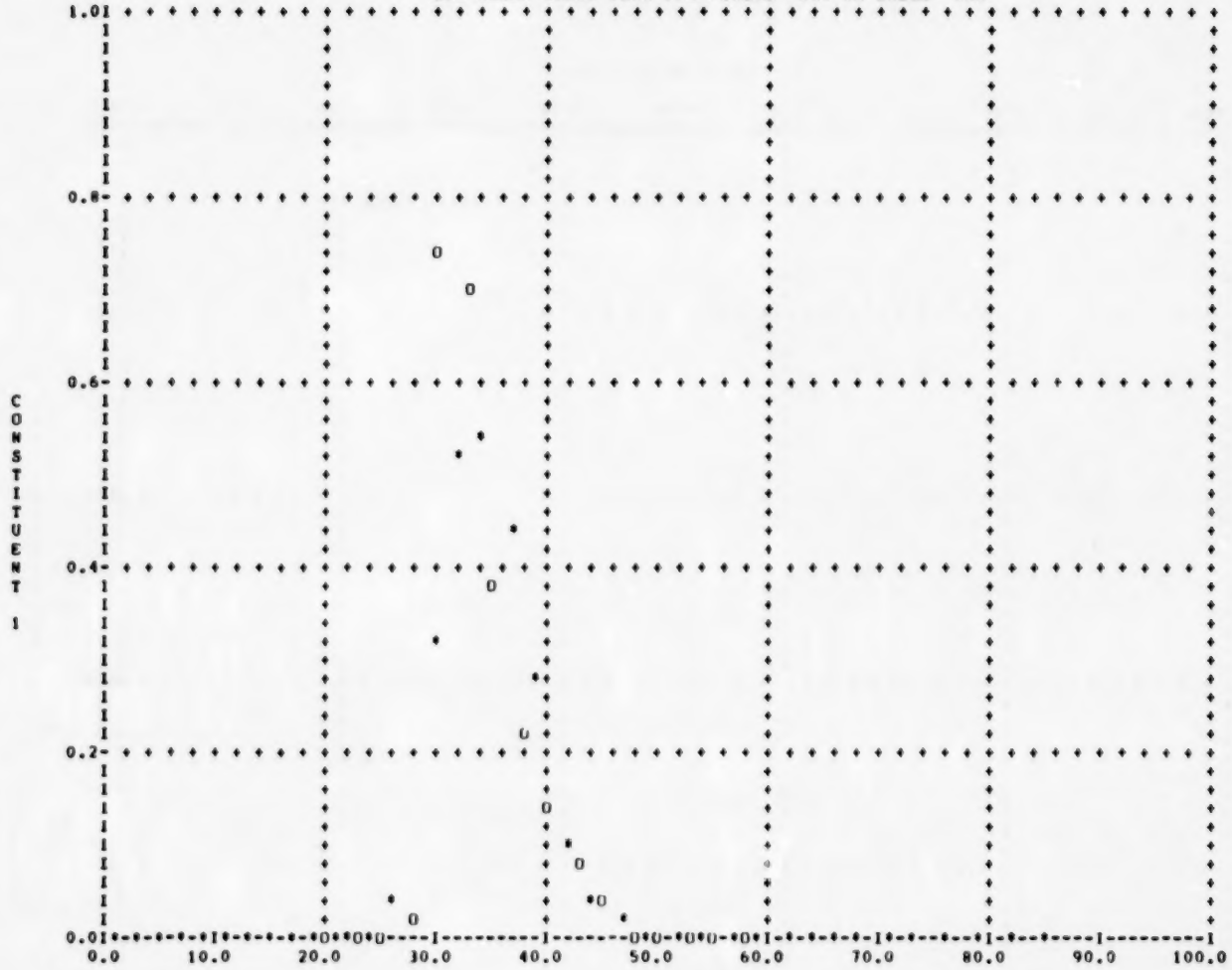
DELAWARE ESTUARY CENTER CHANNEL

HIGH WATER SLACK PLOT FROM CYCLE 102 TO CYCLE 109



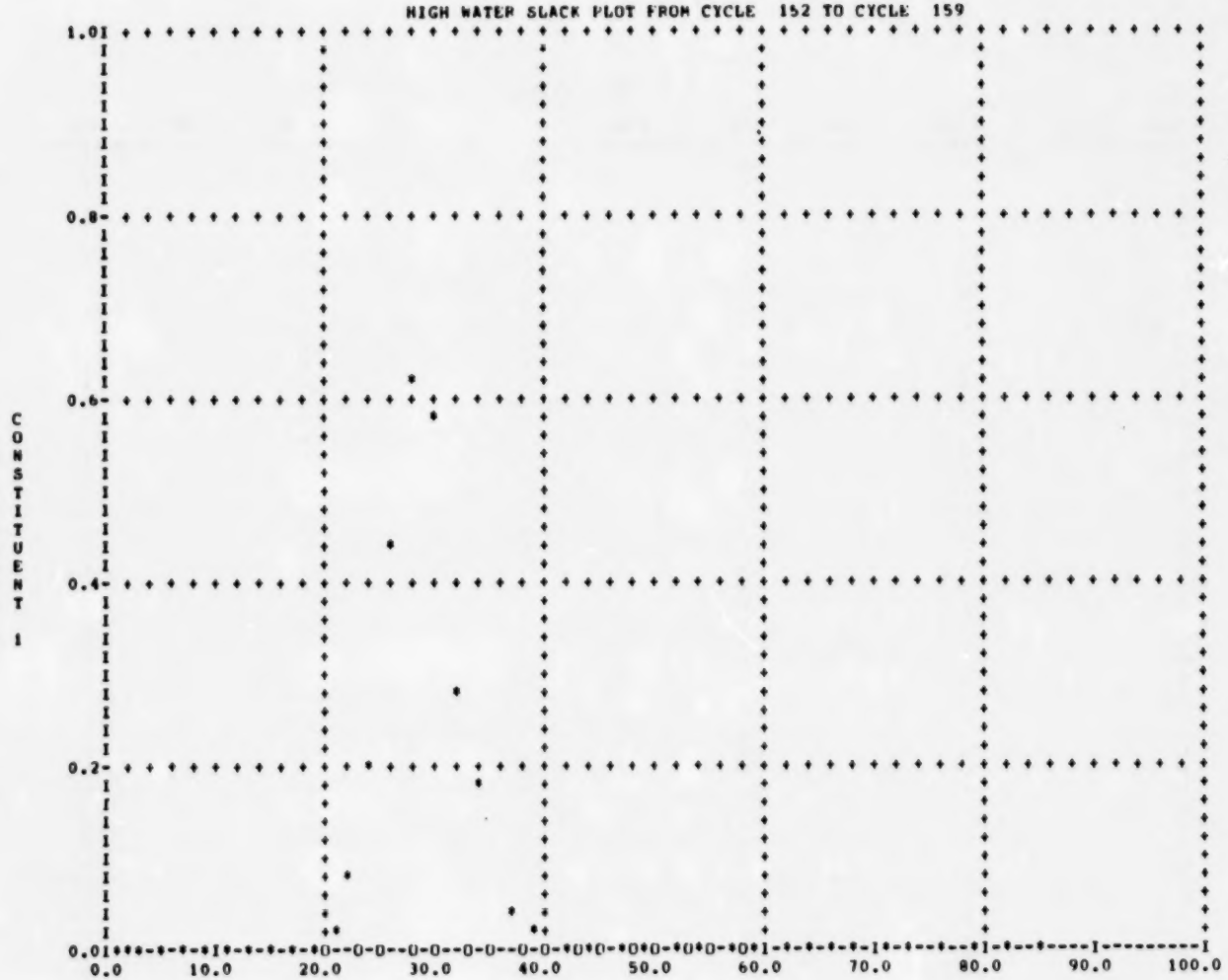
DELAWARE ESTUARY CENTER CHANNEL

LOW WATER SLACK PLOT FROM CYCLE 141 TO CYCLE 151



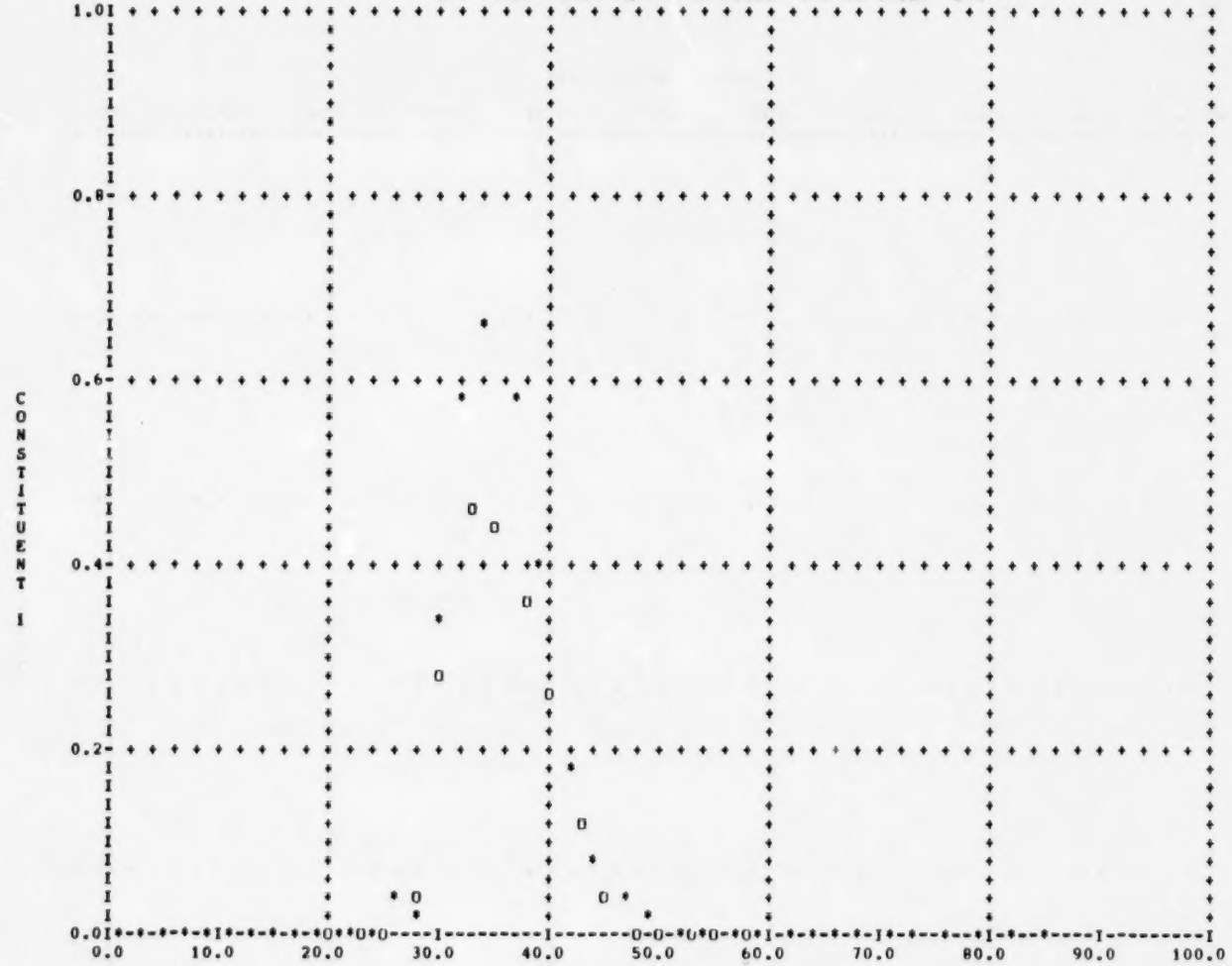
DELAWARE ESTUARY CENTER CHANNEL

HIGH WATER SLACK PLOT FROM CYCLE 152 TO CYCLE 159



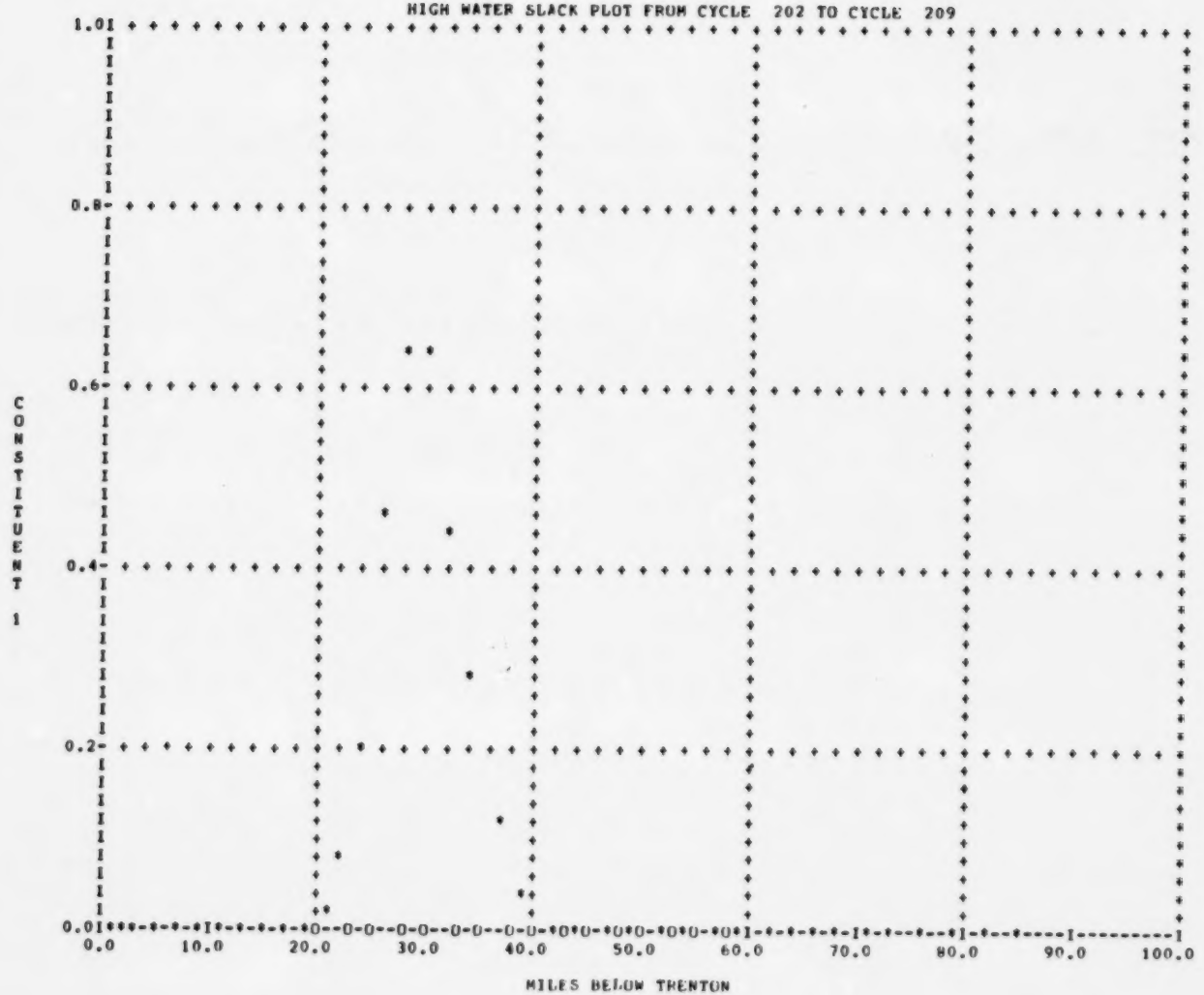
DELAWARE ESTUARY CENTER CHANNEL

LOW WATER SLACK PLOT FROM CYCLE 191 TO CYCLE 201



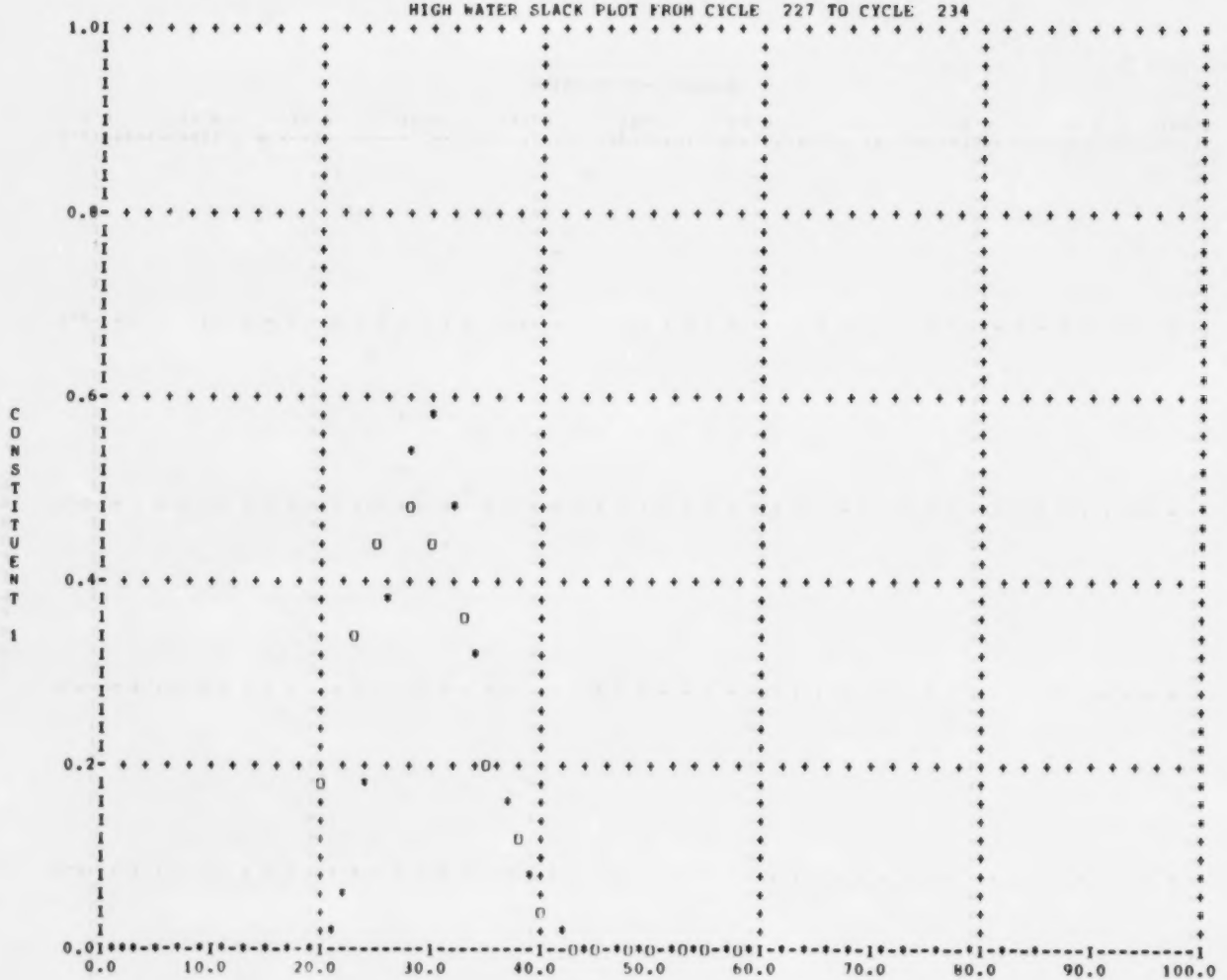
DELAWARE ESTUARY CENTER CHANNEL

HIGH WATER SLACK PLOT FROM CYCLE 202 TO CYCLE 209



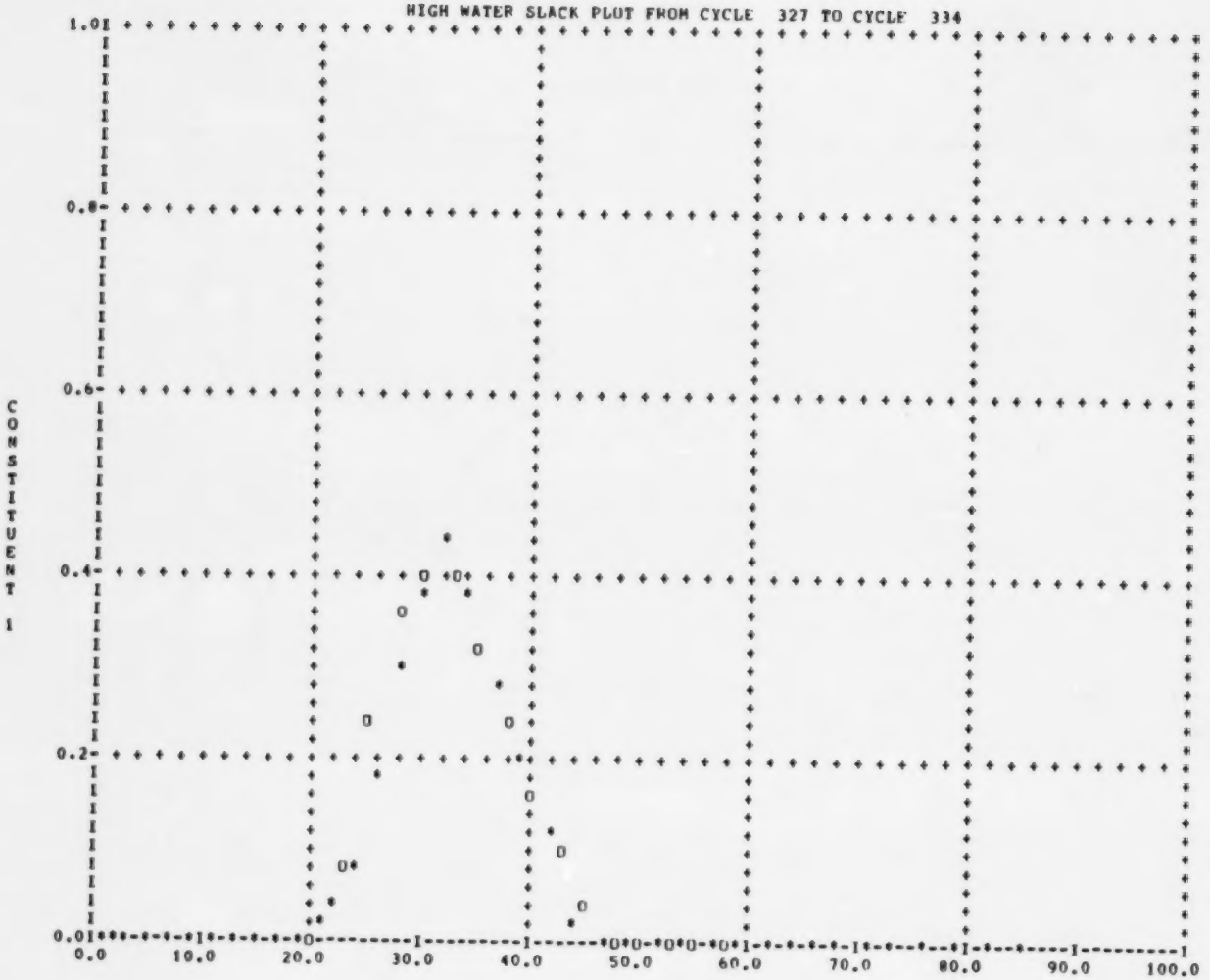
DELAWARE ESTUARY CENTER CHANNEL

HIGH WATER SLACK PLOT FROM CYCLE 227 TO CYCLE 234



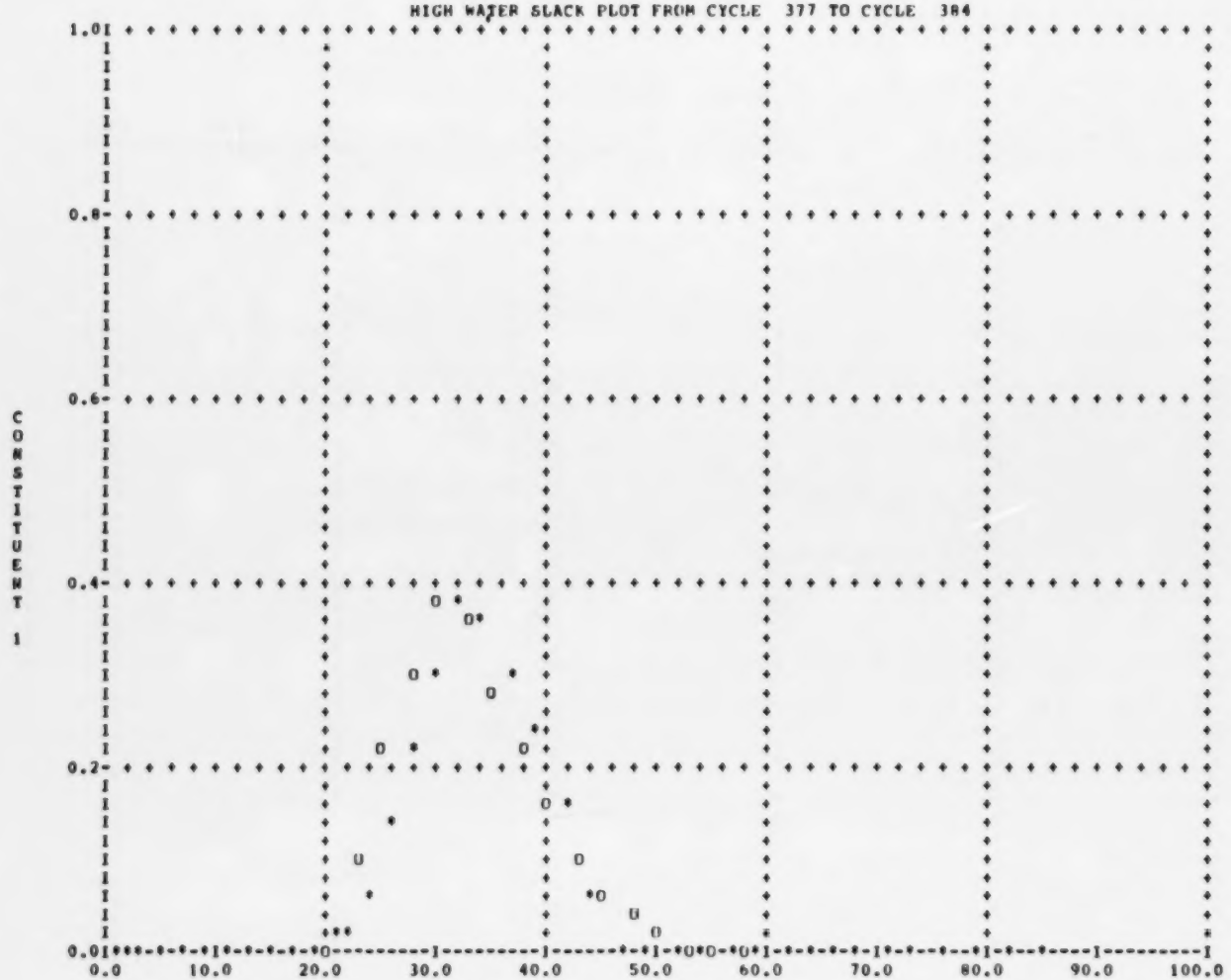
DELAWARE ESTUARY CENTER CHANNEL

HIGH WATER SLACK PLOT FROM CYCLE 327 TO CYCLE 334



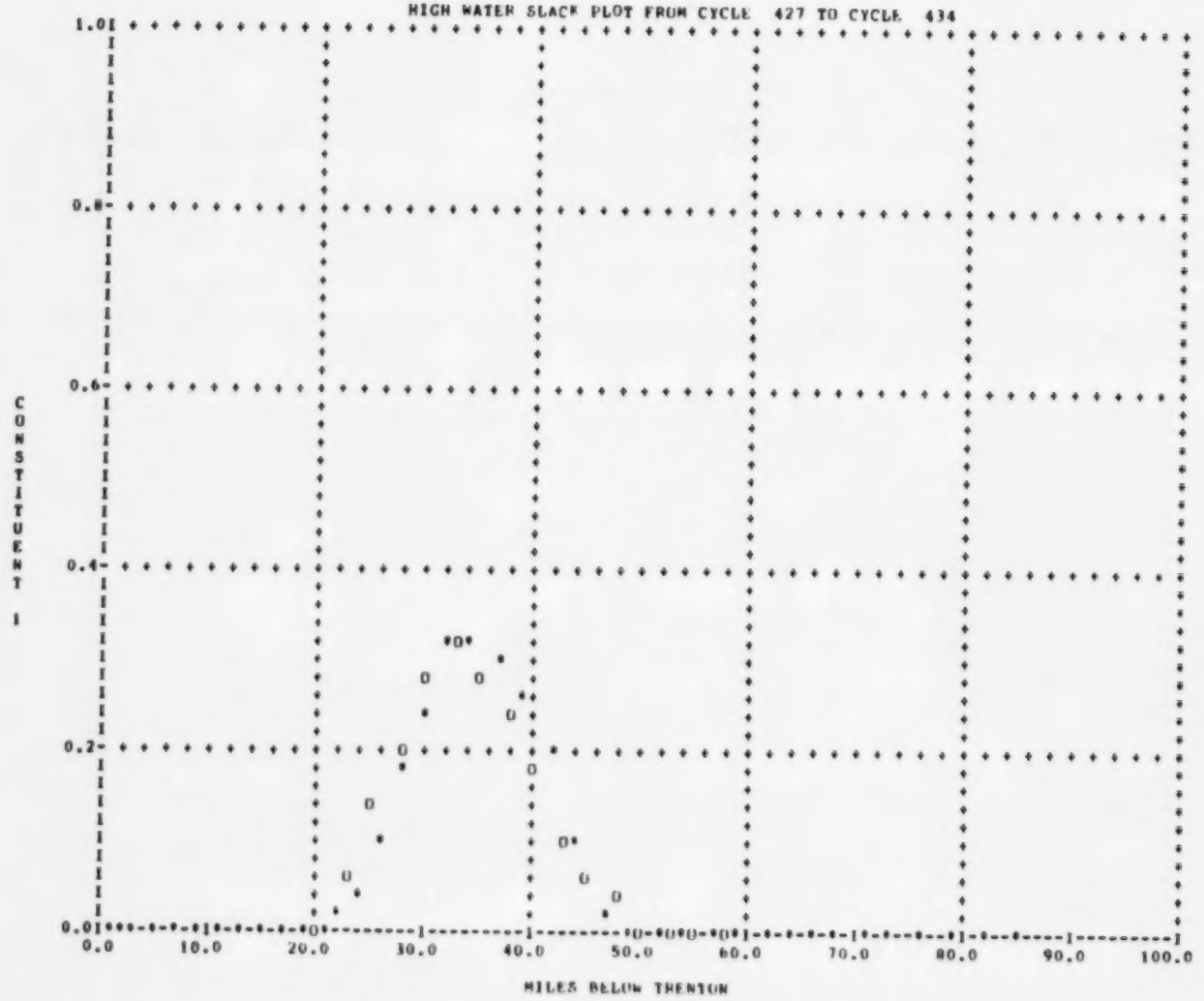
DELAWARE ESTUARY CENTER CHANNEL

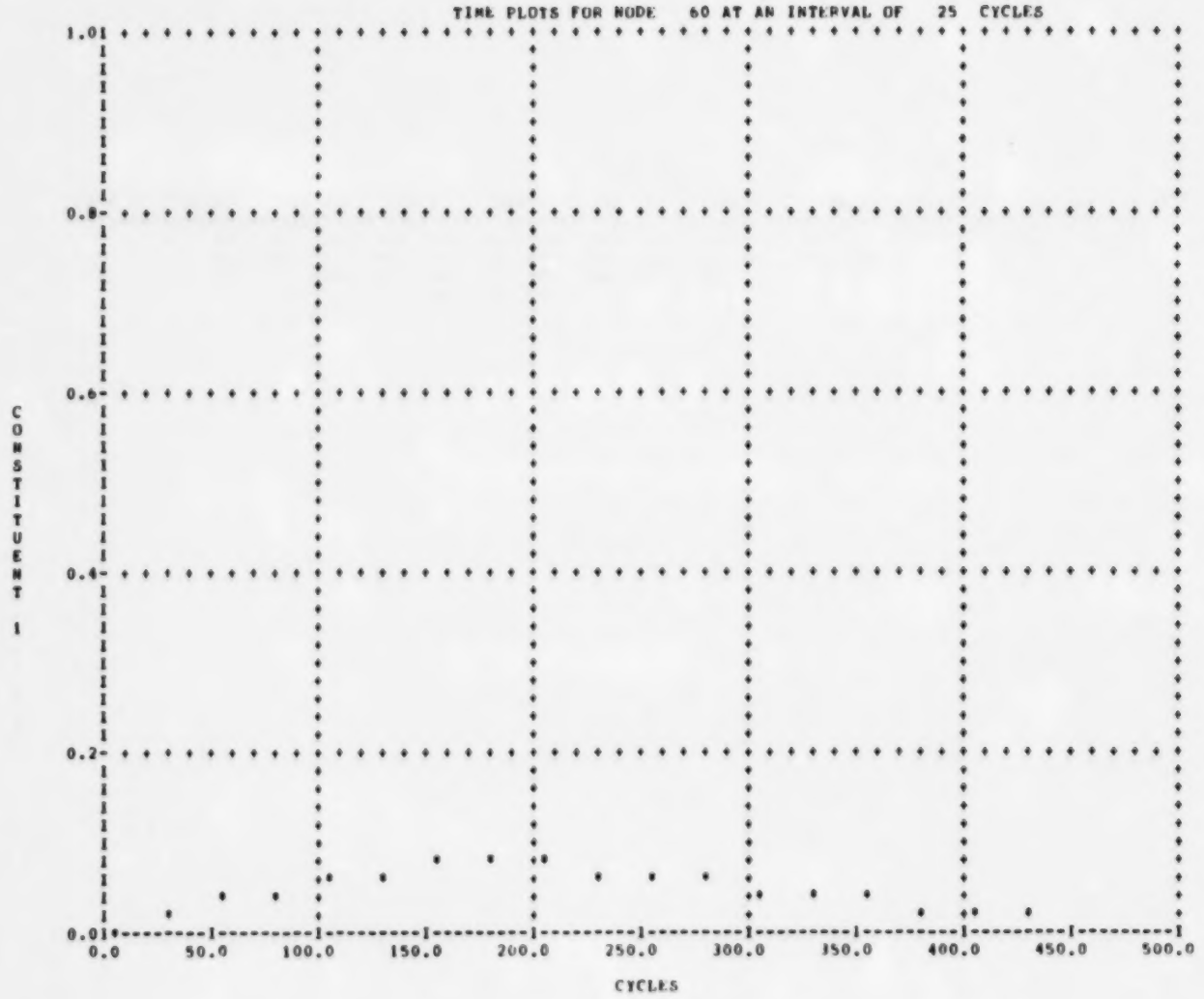
HIGH WATER SLACK PLOT FROM CYCLE 377 TO CYCLE 384

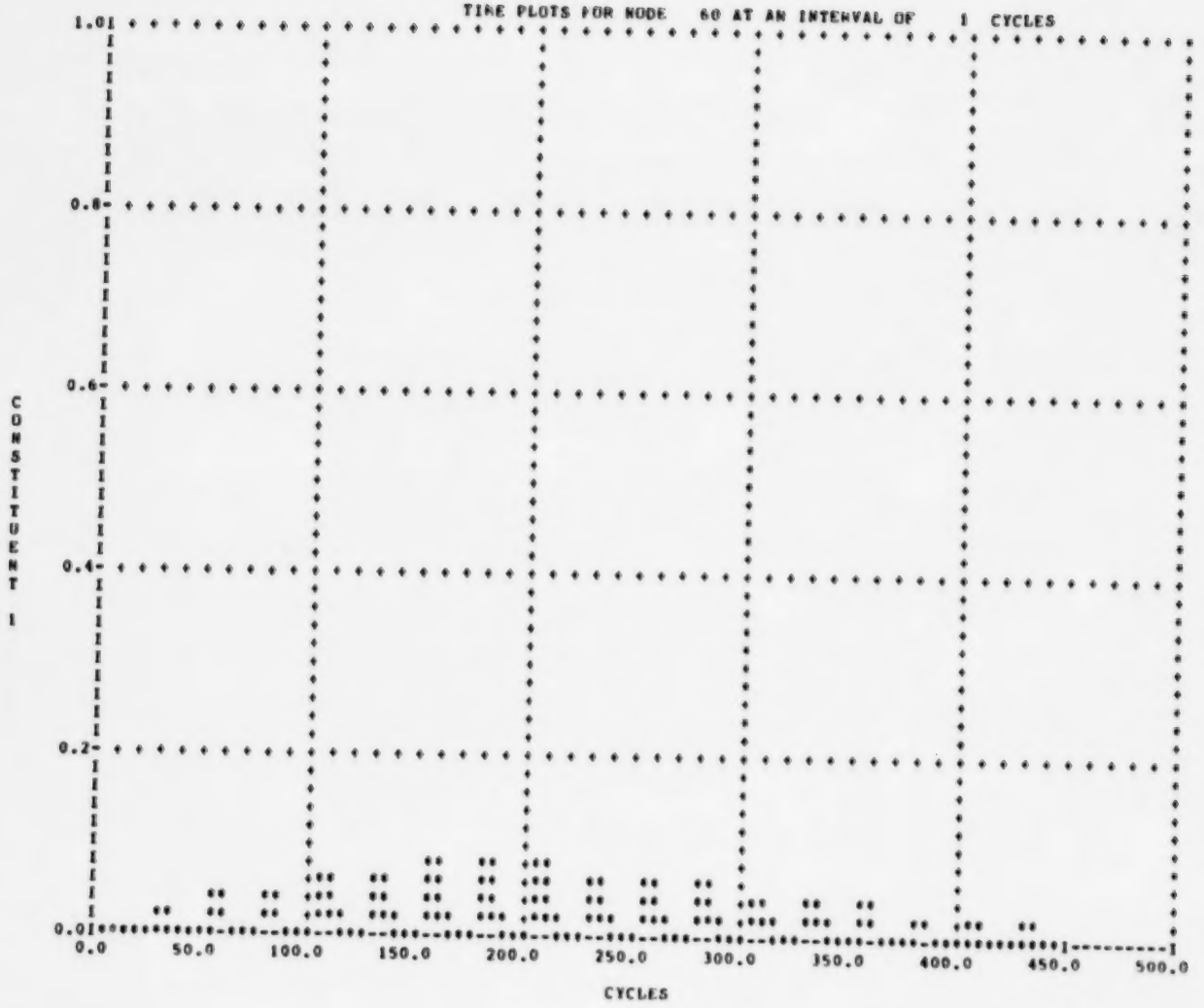


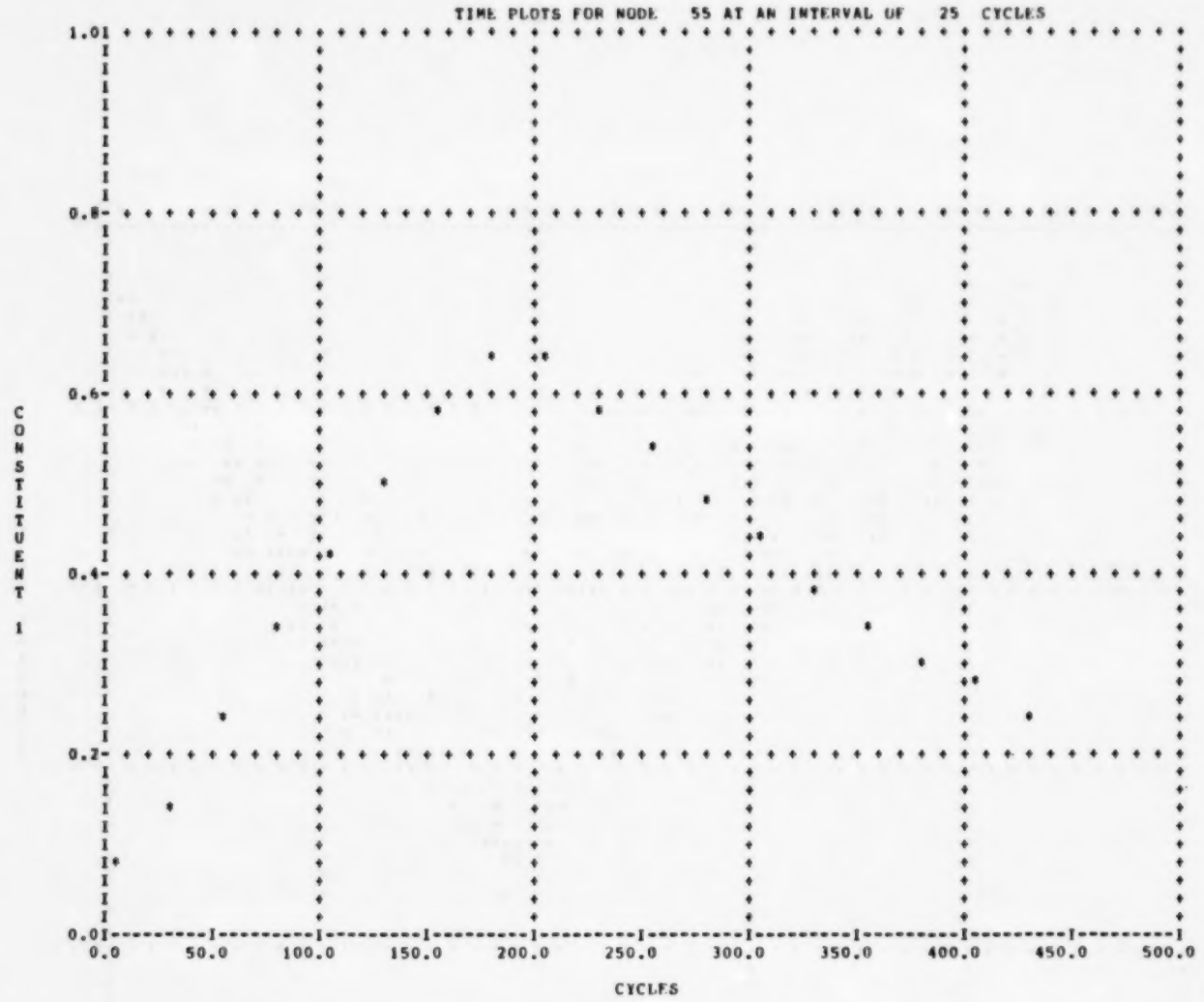
DELAWARE ESTUARY CENTER CHANNEL

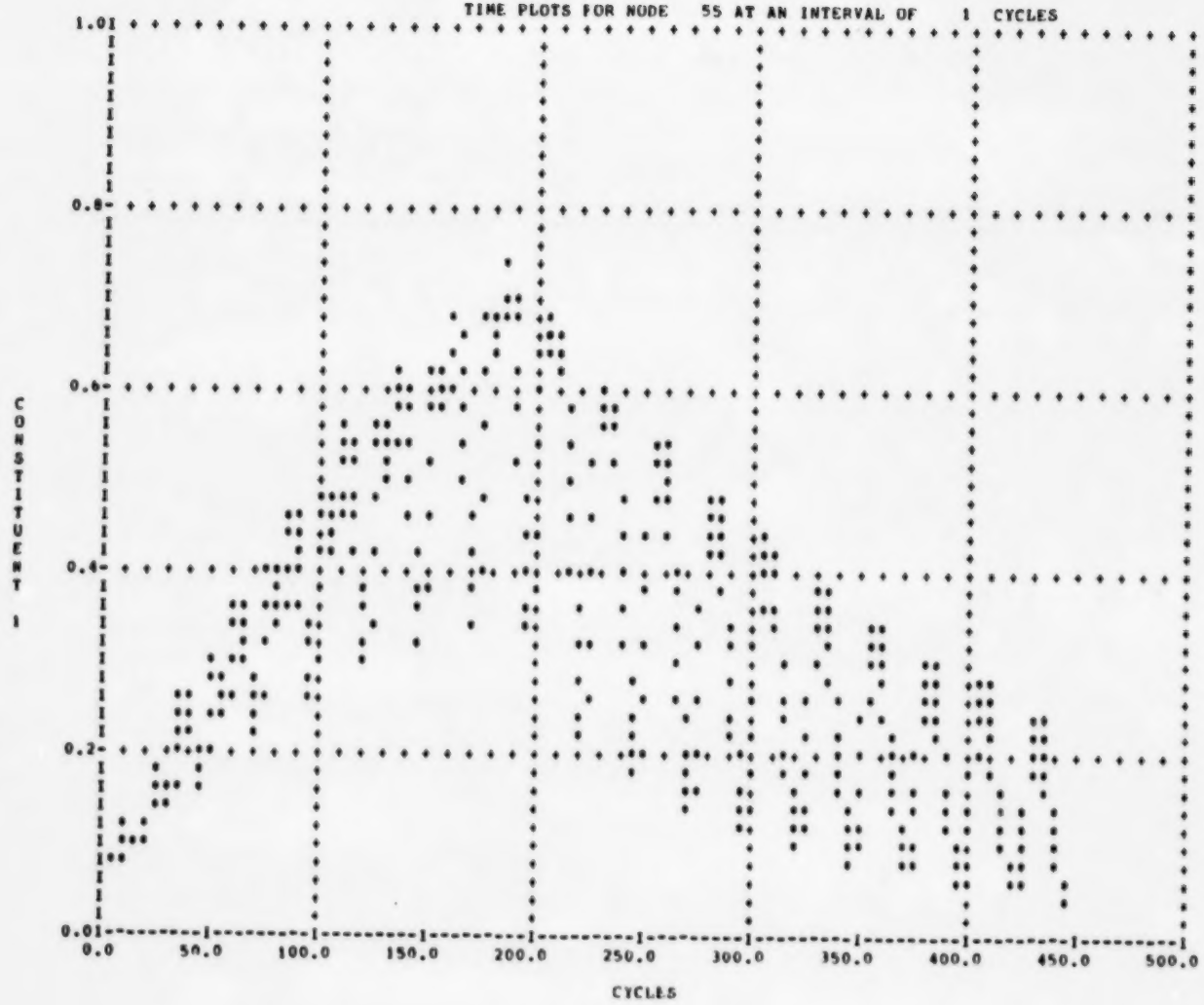
HIGH WATER SLACK PLOT FROM CYCLE 427 TO CYCLE 434




TIME PLOTS FOR NODE 60 AT AN INTERVAL OF 25 CYCLES
CONSTITUENT 1
1.0
0.8
0.6
0.4
0.2
0.0
0.0
50.0
100.0
150.0
200.0
250.0
300.0
350.0
400.0
450.0
500.0
CYCLES


TIME PLOTS FOR NODE 60 AT AN INTERVAL OF 1 CYCLES
CONSTITUENT 1
1.0
0.8
0.6
0.4
0.2
0.0
0.0
50.0
100.0
150.0
200.0
250.0
300.0
350.0
400.0
450.0
500.0
CYCLES


TIME PLOTS FOR NODE 55 AT AN INTERVAL OF 25 CYCLES
CONSTITUENT 1
1.0
0.8
0.6
0.4
0.2
0.0
0.0
50.0
100.0
150.0
200.0
250.0
300.0
350.0
400.0
450.0
500.0
CYCLES


TIME PLOTS FOR NODE 55 AT AN INTERVAL OF 1 CYCLES
CONSTITUENT 1
1.0
0.8
0.6
0.4
0.2
0.01
0.0
50.0
100.0
150.0
200.0
250.0
300.0
350.0
400.0
450.0
500.0
CYCLES

A.4 DYE - TEST CASE OUTPUT LISTING #2

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*
*****************************************************************************************************************************

                    SECTION 2.1              SET PROGRAM CONTROL OPTIONS

*
*****************************************************************************************************************************


DELAWARE ESTUARY (INCLUDING C&D CANAL) HYDRAULIC MODEL ** (76 JUNCTIONS)                    ENVIRONMENTAL PROTECTION AGENCY
DELAWARE FLOW = 8850 CFS , SCHUYLKILL  = 925 CFS  FILE CN.FPAJYF.SW02.H8850                 DYNAMIC WATER QUALITY MODEL
DELAWARE ESTUARY 1-D NETWORK, DYE STUDY PERIOD 2. DELAWARE R FLOW = 8850 CFS
                 SIMULATION PERIOD : AUG 1 - AUG 3, 1974

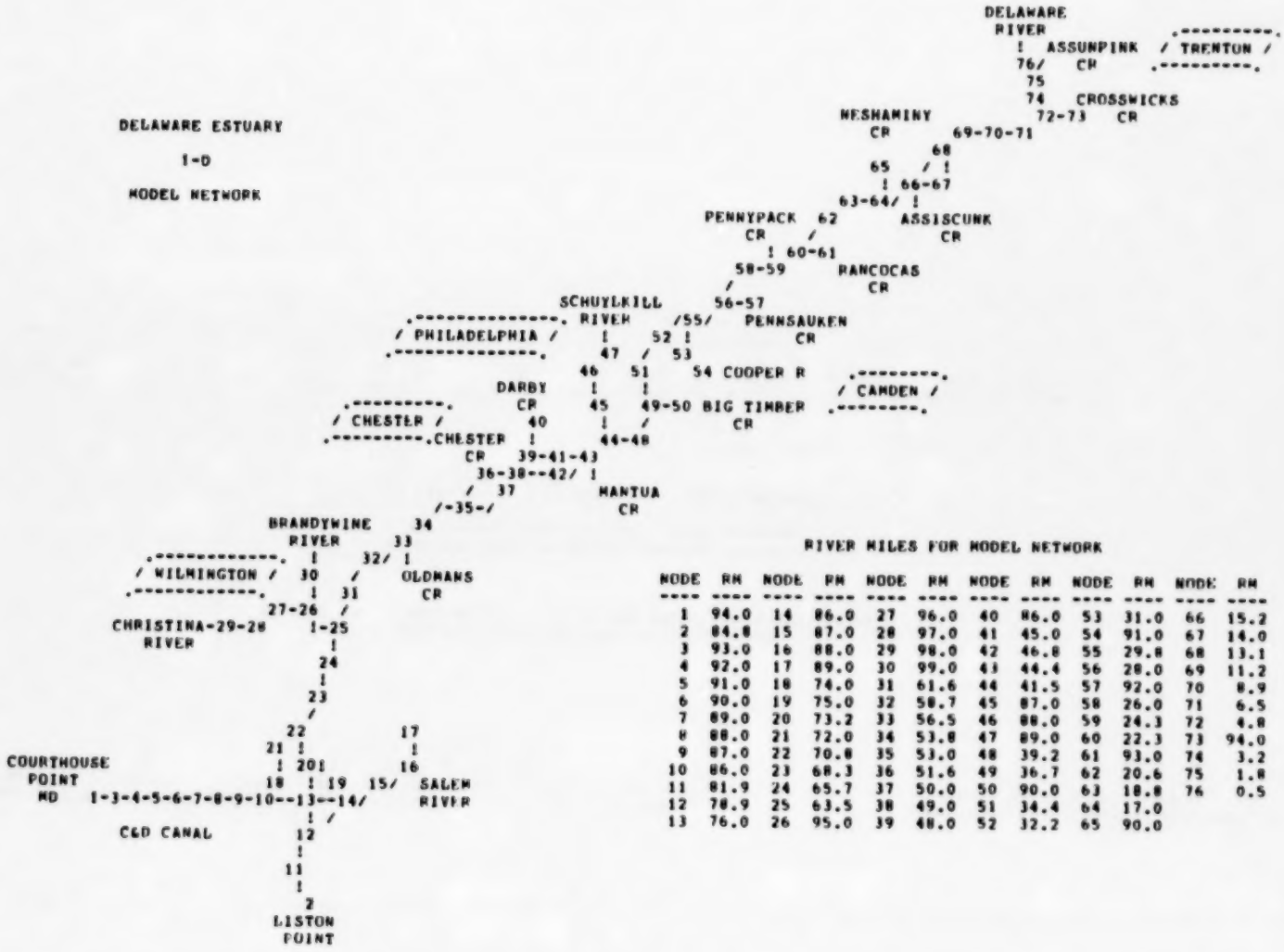

                              THIS SIMULATION BEGINS AT 12.00 HOURS
                       SUNRISE AND SUNSET OCCUR AT  6.00 AND 18.00 HOURS,RESPECTIVELY


                              ******** FROM HYDRAULICS PROGRAM ********
                              START CYCLE   STOP CYCLE    TIME INTERVAL

                                  150          300        300.  SECONDS


STARTING CYCLE  INITIAL QUALITY  TOTAL QUALITY  DEPLETION CORRECT TIME INTERVAL IN  START OF  START OF  DURATION  END OF
ON HYD EXT TAPE      CYCLE          CYCLES          OPTION        QUALITY PROGRAM    FLOOD      EBB     OF FLOOD   EBB

     294             449            598             2            0.500 HOURS        18         4        11       17
```



RIVER MILES FOR MODEL NETWORK

NODE	RM	NODE	RM	NODE	RM	NODE	RM	NODE	RM	NODE	RM
1	94.0	14	86.0	27	96.0	40	86.0	53	31.0	66	15.2
2	84.8	15	87.0	28	97.0	41	45.0	54	91.0	67	14.0
3	93.0	16	88.0	29	98.0	42	46.8	55	29.8	68	13.1
4	92.0	17	89.0	30	99.0	43	44.4	56	28.0	69	11.2
5	91.0	18	74.0	31	61.6	44	41.5	57	92.0	70	8.9
6	90.0	19	75.0	32	58.7	45	87.0	58	26.0	71	6.5
7	89.0	20	73.2	33	56.5	46	88.0	59	24.3	72	4.8
8	88.0	21	72.0	34	53.8	47	89.0	60	22.3	73	94.0
9	87.0	22	70.8	35	53.0	48	39.2	61	93.0	74	3.2
10	86.0	23	68.3	36	51.6	49	36.7	62	20.6	75	1.8
11	81.9	24	65.7	37	50.0	50	90.0	63	18.8	76	0.5
12	78.9	25	63.5	38	49.0	51	34.4	64	17.0		
13	76.0	26	95.0	39	48.0	52	32.2	65	90.0		

THE FOLLOWING 4 JUNCTIONS HAVE TIME PLOTS

JUNCTION	STARTING CYCLE	ENDING CYCLE	CYCLE INTERVAL (1=PLOT 0=NO PLOT)	CON1	CON2	CON3	CON4	CON5
60	27	597	25	1	0	0	0	0
60	27	597	1	1	0	0	0	0
55	27	597	25	1	0	0	0	0
55	27	597	1	1	0	0	0	0

SECTION 2.2 DEFINE WATER QUALITY CONSTITUENTS

THIS RUN CONSIDERS 1 CONSTITUENTS

CONSTITUENT 1 IS DYE (UG/L)

***** TABLE OF TRANSFER COEFFICIENTS AND FUNCTION OPERATORS *****

CNST(K)	CO(1,K)	CO(2,K)	CO(3,K)	CO(4,K)	CO(5,K)	FUNC1	FUNC2	FUNC3	FUNC4	FUNC5	FUNC6	FUNC7	FUNC8	FUNC9	FUNC10	FUNC11	FUNC12
1	-1.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

THE TEMPERATURE FROM CYCLE 1 THROUGH CYCLE 2400 IS 20.0 DEGREES C

TABLE OF DECAY RATES (AT 20. C)

SIMULATION PERIOD : AUG 1 - AUG 3, 1974

CONSTITUENT 1 IS DYE (UG/L)

NODE	******** PRIMARY DECAY RATES 1/DAY (BASE E) *******					SECONDARY DECAY 1/DAY	
	CONST1	CONST2	CONST3	CONST4	CONST5	CONST0	CONST0
1	0.020	0.0	0.0	0.0	0.0	0.0	0.0
2	0.020	0.0	0.0	0.0	0.0	0.0	0.0
3	0.020	0.0	0.0	0.0	0.0	0.0	0.0
4	0.020	0.0	0.0	0.0	0.0	0.0	0.0
5	0.020	0.0	0.0	0.0	0.0	0.0	0.0
6	0.020	0.0	0.0	0.0	0.0	0.0	0.0
7	0.020	0.0	0.0	0.0	0.0	0.0	0.0
8	0.020	0.0	0.0	0.0	0.0	0.0	0.0
9	0.020	0.0	0.0	0.0	0.0	0.0	0.0
10	0.020	0.0	0.0	0.0	0.0	0.0	0.0
11	0.020	0.0	0.0	0.0	0.0	0.0	0.0
12	0.020	0.0	0.0	0.0	0.0	0.0	0.0
13	0.020	0.0	0.0	0.0	0.0	0.0	0.0
14	0.020	0.0	0.0	0.0	0.0	0.0	0.0
15	0.020	0.0	0.0	0.0	0.0	0.0	0.0
16	0.020	0.0	0.0	0.0	0.0	0.0	0.0
17	0.020	0.0	0.0	0.0	0.0	0.0	0.0
18	0.020	0.0	0.0	0.0	0.0	0.0	0.0
19	0.020	0.0	0.0	0.0	0.0	0.0	0.0
20	0.020	0.0	0.0	0.0	0.0	0.0	0.0
21	0.020	0.0	0.0	0.0	0.0	0.0	0.0
22	0.020	0.0	0.0	0.0	0.0	0.0	0.0
23	0.020	0.0	0.0	0.0	0.0	0.0	0.0
24	0.020	0.0	0.0	0.0	0.0	0.0	0.0
25	0.020	0.0	0.0	0.0	0.0	0.0	0.0
26	0.020	0.0	0.0	0.0	0.0	0.0	0.0
27	0.020	0.0	0.0	0.0	0.0	0.0	0.0
28	0.020	0.0	0.0	0.0	0.0	0.0	0.0
29	0.020	0.0	0.0	0.0	0.0	0.0	0.0
30	0.020	0.0	0.0	0.0	0.0	0.0	0.0
31	0.020	0.0	0.0	0.0	0.0	0.0	0.0
32	0.020	0.0	0.0	0.0	0.0	0.0	0.0
33	0.020	0.0	0.0	0.0	0.0	0.0	0.0
34	0.020	0.0	0.0	0.0	0.0	0.0	0.0
35	0.020	0.0	0.0	0.0	0.0	0.0	0.0
36	0.020	0.0	0.0	0.0	0.0	0.0	0.0
37	0.020	0.0	0.0	0.0	0.0	0.0	0.0
38	0.020	0.0	0.0	0.0	0.0	0.0	0.0
39	0.020	0.0	0.0	0.0	0.0	0.0	0.0
40	0.020	0.0	0.0	0.0	0.0	0.0	0.0
41	0.020	0.0	0.0	0.0	0.0	0.0	0.0
42	0.020	0.0	0.0	0.0	0.0	0.0	0.0

43	0.020	0.0	0.0	0.0	0.0	0.0	0.0
44	0.020	0.0	0.0	0.0	0.0	0.0	0.0
45	0.020	0.0	0.0	0.0	0.0	0.0	0.0
46	0.020	0.0	0.0	0.0	0.0	0.0	0.0
47	0.020	0.0	0.0	0.0	0.0	0.0	0.0
48	0.020	0.0	0.0	0.0	0.0	0.0	0.0
49	0.020	0.0	0.0	0.0	0.0	0.0	0.0
50	0.020	0.0	0.0	0.0	0.0	0.0	0.0
51	0.020	0.0	0.0	0.0	0.0	0.0	0.0
52	0.020	0.0	0.0	0.0	0.0	0.0	0.0
53	0.020	0.0	0.0	0.0	0.0	0.0	0.0
54	0.020	0.0	0.0	0.0	0.0	0.0	0.0
55	0.020	0.0	0.0	0.0	0.0	0.0	0.0
56	0.020	0.0	0.0	0.0	0.0	0.0	0.0
57	0.020	0.0	0.0	0.0	0.0	0.0	0.0
58	0.020	0.0	0.0	0.0	0.0	0.0	0.0
59	0.020	0.0	0.0	0.0	0.0	0.0	0.0
60	0.020	0.0	0.0	0.0	0.0	0.0	0.0
61	0.020	0.0	0.0	0.0	0.0	0.0	0.0
62	0.020	0.0	0.0	0.0	0.0	0.0	0.0
63	0.020	0.0	0.0	0.0	0.0	0.0	0.0
64	0.020	0.0	0.0	0.0	0.0	0.0	0.0
65	0.020	0.0	0.0	0.0	0.0	0.0	0.0
66	0.020	0.0	0.0	0.0	0.0	0.0	0.0
67	0.020	0.0	0.0	0.0	0.0	0.0	0.0
68	0.020	0.0	0.0	0.0	0.0	0.0	0.0
69	0.020	0.0	0.0	0.0	0.0	0.0	0.0
70	0.020	0.0	0.0	0.0	0.0	0.0	0.0
71	0.020	0.0	0.0	0.0	0.0	0.0	0.0
72	0.020	0.0	0.0	0.0	0.0	0.0	0.0
73	0.020	0.0	0.0	0.0	0.0	0.0	0.0
74	0.020	0.0	0.0	0.0	0.0	0.0	0.0
75	0.020	0.0	0.0	0.0	0.0	0.0	0.0
76	0.020	0.0	0.0	0.0	0.0	0.0	0.0

TEMPERATURE CORRECTION FACTORS , THETA

1.000	1.000	1.000	1.000	1.000	1.000	1.000

*

****

SECTION 2.3 SPECIFY WASTEWATER AND TRIBUTARY LOADS

*

****

SUMMARY OF POINT SOURCE INPUTS

SIMULATION PERIOD : AUG 1 - AUG 3, 1974

CONSTITUENT 1 IS DYE (UG/L)

MUNICIPAL AND INDUSTRIAL WASTEWATER AND TRIBUTARY INFLOW BY NODE

INPUT NODE	NAME OF DISCHARGE	TYPE OF DISCHARGE	******* FLOW ******* MGD	CFS	UNADJUSTED CONC (MG/L) * ADJ. FACTORS CONST1	CONST2	CONST3	CONST4	CONST5	ADJUSTED INPUT LOADS - 1000 LB/DAY CONST1	CONST2	CONST3	CONST4	CONST5
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***** VARYING WASTE LOADINGS *****

NODE 55 LOCATED IN ZONE 3 RECEIVES TYPE 1 LOADS FROM PHILA NE (MUN)

DISCHARGE PERIOD = 2400 CYCLES

START CYCLE	DURATION (CYCLES)	FLOW (CFS)	CONST1 (MG/L)	CONST2 (MG/L)	CONST3 (MG/L)	CONST4 (MG/L)	CONST5 (MG/L)
1	196	-254.97	24.80				
197	2204	-254.97	0.0				

SECTION 2.4 SPECIFY WATER QUALITY BOUNDARY CONDITIONS

SEAWARD BOUNDARY CONDITIONS

NODE 1 : COURTHOUSE PT , MARYLAND

' CIN1 ' PERIOD = 2400 CYCLES

START CYCLE	DURATION (CYCLES)	CONST1 (MG/L)	CONST2 (MG/L)	CONST3 (MG/L)	CONST4 (MG/L)	CONST5 (MG/L)
1	2400	0.0				

NODE 2 : LISTON PT , DELAWARE

CINMAX ' PERIOD = 2400 CYCLES

START CYCLE	DURATION (CYCLES)	CONST1 (MG/L)	CONST2 (MG/L)	CONST3 (MG/L)	CONST4 (MG/L)	CONST5 (MG/L)
1	2400	0.0				

UPSTREAM BOUNDARY CONDITIONS

NODE 76 RECIEVES VARYING LOADS FROM DELAWARE (RIVR)

DISCHARGE PERIOD = 2400 CYCLES

START CYCLE	DURATION (CYCLES)	FLOW (CFS)	CONST1 (MG/L)	CONST2 (MG/L)	CONST3 (MG/L)	CONST4 (MG/L)	CONST5 (MG/L)
1	2400	-8850.00	0.0				

SECTION 2.5 PRINT HYDRAULIC INPUTS

JUNCTION HEAD AND HYD. RADIUS AND X-SECTIONAL AREA OF CHANNELS ARE AT MEAN TIDE **

CHAN.	LENGTH	WIDTH	AREA	CHANNEL DATA MANNING	NET FLOW	HYD. RADIUS	JUNC. AT ENDS	
1	7000.	2400.	31045.	0.010	-1079.84	12.9	1	3
2	11000.	850.	24482.	0.010	-1079.87	28.8	3	4
3	11000.	650.	18651.	0.010	-1079.86	28.7	4	5
4	11000.	600.	17099.	0.010	-1079.86	28.5	5	6
5	11000.	600.	16926.	0.010	-1079.87	28.2	6	7
6	11000.	600.	13779.	0.010	-1079.90	23.0	7	8
7	11000.	600.	12401.	0.010	-1079.88	20.7	8	9
8	15679.	600.	11067.	0.010	-1079.88	18.4	9	10
9	14994.	12995.	213596.	0.010	-10242.85	16.4	2	11
10	14994.	11829.	183764.	0.010	-10243.10	15.5	11	12
11	14994.	7700.	119699.	0.010	-13562.52	15.5	12	13
12	11995.	4500.	78394.	0.010	-1079.84	17.4	10	13
13	19326.	1700.	12059.	0.010	3318.17	7.1	12	14
14	7330.	7600.	69340.	0.010	5656.93	9.1	13	14
15	8996.	1000.	8676.	0.015	-17.75	8.7	14	15
16	8996.	4332.	32947.	0.015	-17.31	7.6	15	16
17	8996.	5331.	40661.	0.015	-16.16	7.6	16	17
18	13661.	3800.	54008.	0.010	6629.55	14.2	13	18
19	8996.	5600.	24167.	0.010	8992.89	4.3	14	19
20	13661.	3400.	70592.	0.010	-26930.19	20.8	13	20
21	10662.	6000.	46180.	0.010	6629.60	7.7	18	21
22	9663.	4900.	48295.	0.010	8992.80	9.9	19	20
23	10996.	7600.	98750.	0.010	6629.63	13.0	21	22
24	13994.	3900.	67107.	0.010	-17937.36	17.2	20	22
25	13661.	8996.	150353.	0.010	-11307.73	16.7	22	23
26	11995.	8274.	147203.	0.010	-11307.66	17.8	23	24
27	11995.	6942.	146133.	0.010	-11307.66	21.1	24	25
28	9330.	1000.	14387.	0.015	-600.00	14.4	25	26
29	9330.	722.	7545.	0.015	-200.01	10.5	26	27
30	9330.	389.	3615.	0.015	-200.01	9.3	27	28
31	9330.	278.	2303.	0.015	-200.00	8.3	28	29
32	9330.	389.	2259.	0.015	-399.99	5.8	26	30
33	11995.	8163.	148606.	0.016	-10707.64	18.2	25	31
34	11995.	7441.	128647.	0.016	-10707.64	17.3	31	32
35	11995.	6997.	114719.	0.016	-10707.49	16.4	32	33
36	13328.	5720.	115261.	0.016	-10707.21	20.2	33	34
37	11995.	4054.	91189.	0.020	-11543.16	22.5	34	36
38	10662.	3887.	64094.	0.020	885.25	16.5	34	35
39	11995.	4332.	86219.	0.020	-11459.93	19.9	36	38
40	7330.	2443.	15825.	0.020	885.36	6.5	35	37
41	7330.	2100.	18584.	0.020	885.47	8.8	37	38
42	6331.	2600.	30126.	0.020	-36.84	11.6	38	39
43	11995.	4942.	92748.	0.020	-10537.15	18.8	38	42
44	8996.	300.	1815.	0.020	-60.08	6.0	39	40
45	6331.	1944.	13495.	0.020	23.40	6.9	39	41
46	11995.	2388.	28915.	0.020	23.63	12.1	41	43
47	11995.	3499.	78126.	0.020	-10536.73	22.3	42	43

JUNC.	INFLOW	HEAD	JUNCTION DATA CHANNELS ENTERING JUNCTION				
1	0.0	0.10	1	0	0	0	0
2	0.0	-0.00	9	0	0	0	0
3	0.0	0.10	1	2	0	0	0
4	0.0	0.11	2	3	0	0	0
5	0.0	0.11	3	4	0	0	0
6	0.0	0.12	4	5	0	0	0
7	0.0	0.12	5	6	0	0	0
8	0.0	0.13	6	7	0	0	0
9	0.0	0.14	7	8	0	0	0
10	0.0	0.15	8	12	0	0	0
11	0.0	0.03	9	10	0	0	0
12	0.0	0.07	10	11	13	0	0
13	0.0	0.15	11	12	14	18	20
14	0.0	0.16	13	14	15	19	0
15	0.0	0.24	15	16	0	0	0
16	0.0	0.24	16	17	0	0	0
17	-15.0	0.24	17	0	0	0	0
18	0.0	0.17	18	21	0	0	0
19	0.0	0.20	19	22	0	0	0
20	0.0	0.20	20	22	24	0	0
21	0.0	0.26	21	23	0	0	0
22	0.0	0.27	23	24	25	0	0
23	0.0	0.29	25	26	0	0	0
24	0.0	0.31	26	27	0	0	0
25	0.0	0.32	27	28	33	0	0
26	0.0	0.32	28	29	32	0	0
27	0.0	0.32	29	30	0	0	0
28	0.0	0.31	30	31	0	0	0
29	-200.0	0.31	31	0	0	0	0
30	-400.0	0.34	32	0	0	0	0
31	0.0	0.34	33	34	0	0	0
32	0.0	0.37	34	35	0	0	0
33	0.0	0.41	35	36	0	0	0
34	-49.0	0.43	36	37	38	0	0
35	0.0	0.43	38	40	0	0	0
36	-83.0	0.45	37	39	0	0	0
37	0.0	0.48	40	41	0	0	0
38	0.0	0.49	39	41	42	43	0
39	0.0	0.49	42	44	45	0	0
40	-60.0	0.46	44	0	0	0	0
41	0.0	0.53	45	46	0	0	0
42	0.0	0.51	43	47	0	0	0
43	-24.0	0.53	46	47	48	0	0
44	0.0	0.55	48	49	52	0	0
45	0.0	0.55	49	50	0	0	0
46	0.0	0.55	50	51	0	0	0
47	-925.0	0.55	51	0	0	0	0

48	14994.	3998.	89887.	0.020	-10488.37	22.5	43	44
49	10662.	750.	9259.	0.020	-925.76	12.3	44	45
50	10662.	611.	10239.	0.020	-925.53	16.8	45	46
51	10662.	555.	7364.	0.020	-925.18	13.3	46	47
52	11995.	3887.	86322.	0.020	-9561.50	22.2	44	48
53	11995.	2832.	66163.	0.020	-9560.73	23.4	48	49
54	8996.	167.	2128.	0.020	-0.04	12.7	49	50
55	11995.	2332.	65781.	0.020	-9560.11	28.2	49	51
56	10329.	2888.	76372.	0.020	-9559.61	26.4	51	52
57	6331.	1400.	19162.	0.020	-1110.85	13.7	52	53
58	8996.	300.	2108.	0.020	-32.06	7.0	53	54
59	11995.	3165.	74188.	0.020	-8448.36	23.4	52	55
60	7997.	2499.	30716.	0.020	-1078.66	12.3	53	55
61	9674.	3195.	65984.	0.020	-9271.58	20.7	55	56
62	9007.	300.	3470.	0.020	-14.03	11.6	56	57
63	9674.	2474.	53044.	0.035	-9257.15	21.4	56	58
64	9674.	2752.	58565.	0.035	-9256.75	21.3	58	59
65	9674.	2419.	47495.	0.035	-9256.25	19.6	59	60
66	9007.	600.	8305.	0.035	-175.12	13.8	60	61
67	9007.	2863.	49440.	0.035	-9080.59	17.3	60	62
68	9007.	2391.	44506.	0.035	-9080.02	18.6	62	63
69	9508.	1890.	39104.	0.035	-9079.69	20.7	63	64
70	6331.	334.	4656.	0.035	-159.99	13.9	64	65
71	9508.	1640.	37988.	0.035	-8919.45	23.2	64	66
72	11009.	1307.	31538.	0.035	-7066.76	24.1	66	68
73	7839.	862.	14407.	0.040	-1852.58	16.7	66	67
74	7839.	834.	14080.	0.040	-1852.56	16.9	67	68
75	9674.	1362.	31749.	0.040	-8919.11	23.3	68	69
76	10842.	1334.	32621.	0.040	-8918.70	24.5	69	70
77	12009.	1418.	29612.	0.040	-8917.84	20.9	70	71
78	9007.	1362.	23003.	0.040	-8916.65	16.9	71	72
79	6005.	334.	3871.	0.040	-64.13	11.6	72	73
80	7506.	1473.	21723.	0.040	-8851.54	14.7	72	74
81	8000.	1168.	17118.	0.040	-8850.73	14.7	74	75
82	8000.	862.	9779.	0.040	-8850.18	11.3	75	76

48	0.0	0.56	52	53	0	0	0
49	0.0	0.58	53	54	55	0	0
50	0.0	0.58	54	0	0	0	0
51	0.0	0.59	55	56	0	0	0
52	0.0	0.60	56	57	59	0	0
53	0.0	0.60	57	58	60	0	0
54	-32.0	0.59	58	0	0	0	0
55	-255.0	0.61	59	60	61	0	0
56	0.0	0.62	61	62	63	0	0
57	-14.0	0.62	62	0	0	0	0
58	0.0	0.65	63	64	0	0	0
59	0.0	0.68	64	65	0	0	0
60	0.0	0.71	65	66	67	0	0
61	-175.0	0.71	66	0	0	0	0
62	0.0	0.74	67	68	0	0	0
63	0.0	0.77	68	69	0	0	0
64	0.0	0.79	69	70	71	0	0
65	-160.0	0.79	70	0	0	0	0
66	0.0	0.81	71	72	73	0	0
67	0.0	0.82	73	74	0	0	0
68	0.0	0.83	72	74	75	0	0
69	0.0	0.87	75	76	0	0	0
70	0.0	0.89	76	77	0	0	0
71	0.0	0.94	77	78	0	0	0
72	0.0	0.99	78	79	80	0	0
73	-64.0	0.99	79	0	0	0	0
74	0.0	1.04	80	81	0	0	0
75	0.0	1.10	81	82	0	0	0
76	-8850.0	1.35	82	0	0	0	0

SECTION 2.6 SPECIFY INITIAL WATER QUALITY CONDITIONS

WATER QUALITY DATA

JUNC.	INFLOW	FIRST CONSTITUENT INITIAL CONC.	FIRST CONSTITUENT INFLOW LOAD.	SECOND CONSTITUENT INITIAL CONC.	SECOND CONSTITUENT INFLOW LOAD.	THIRD CONSTITUENT INITIAL CONC.	THIRD CONSTITUENT INFLOW LOAD	FOURTH CONSTITUENT INITIAL CONC.	FOURTH CONSTITUENT INFLOW LOAD	FIFTH CONSTITUENT INITIAL CONC.	FIFTH CONSTITUENT INFLOW LOAD
1	0.0	0.0	0.0								
2	0.0	0.00	0.0								
3	0.0	0.00	0.0								
4	0.0	0.00	0.0								
5	0.0	0.00	0.0								
6	0.0	0.00	0.0								
7	0.0	0.00	0.0								
8	0.0	0.00	0.0								
9	0.0	0.00	0.0								
10	0.0	0.00	0.0								
11	0.0	0.00	0.0								
12	0.0	0.0	0.0								
13	0.0	0.0	0.0								
14	0.0	0.00	0.0								
15	0.0	0.00	0.0								
16	0.0	0.00	0.0								
17	0.0	0.00	0.0								
18	0.0	0.00	0.0								
19	0.0	0.00	0.0								
20	0.0	0.0	0.0								
21	0.0	0.00	0.0								
22	0.0	0.00	0.0								
23	0.0	0.00	0.0								
24	0.0	0.00	0.0								
25	0.0	0.00	0.0								
26	0.0	0.00	0.0								
27	0.0	0.00	0.0								
28	0.0	0.00	0.0								
29	0.0	0.00	0.0								
30	0.0	0.00	0.0								
31	0.0	0.00	0.0								
32	0.0	0.00	0.0								
33	0.0	0.01	0.0								
34	0.0	0.05	0.0								
35	0.0	0.05	0.0								
36	0.0	0.11	0.0								
37	0.0	0.04	0.0								
38	0.0	0.18	0.0								
39	0.0	0.20	0.0								
40	0.0	0.12	0.0								
41	0.0	0.17	0.0								
42	0.0	0.24	0.0								
43	0.0	0.26	0.0								

44	0.0	0.30	0.0
45	0.0	0.17	0.0
46	0.0	0.03	0.0
47	0.0	0.00	0.0
48	0.0	0.31	0.0
49	0.0	0.26	0.0
50	0.0	0.35	0.0
51	0.0	0.18	0.0
52	0.0	0.10	0.0
53	0.0	0.10	0.0
54	0.0	0.09	0.0
55	0.0	0.05	0.0
56	0.0	0.02	0.0
57	0.0	0.00	0.0
58	0.0	0.01	0.0
59	0.0	0.00	0.0
60	0.0	0.00	0.0
61	0.0	0.0	0.0
62	0.0	0.00	0.0
63	0.0	0.00	0.0
64	0.0	0.00	0.0
65	0.0	0.0	0.0
66	0.0	0.00	0.0
67	0.0	0.00	0.0
68	0.0	0.00	0.0
69	0.0	0.00	0.0
70	0.0	0.00	0.0
71	0.0	0.00	0.0
72	0.0	0.00	0.0
73	0.0	0.00	0.0
74	0.0	0.0	0.0
75	0.0	0.0	0.0
76	0.0	0.0	0.0

SECTION 2.8 SET ADVECTIVE AND DISPERSIVE TRANSPORT FACTORS

TRANSPORT FACTORS

CHANNEL NUMBER	VARYING ADVECTION FLOOD TIDE	VARYING ADVECTION EBB TIDE	DIFFUSION FACTORS C4	DIFFUSION FACTORS (A:SQMI/D)
1	1.00	0.0	20.00	1.14
2	1.00	0.0	30.00	4.59
3	1.00	0.0	40.00	7.79
4	1.00	0.0	50.00	10.30
5	1.00	0.0	60.00	12.05
6	1.00	0.0	70.00	13.62
7	1.00	0.0	80.00	15.00
8	1.00	0.0	90.00	16.01
9	0.60	0.0	100.00	10.37
10	0.33	0.0	100.00	10.71
11	0.20	0.0	75.00	11.05
12	1.00	0.33	50.00	1.01
13	0.20	0.0	50.00	2.03
14	0.20	0.0	50.00	1.11
15	0.50	0.0	50.00	5.25
16	0.50	0.0	50.00	1.04
17	0.50	0.0	50.00	0.40
18	0.50	0.0	50.00	4.78
19	0.50	0.0	50.00	0.91
20	0.50	0.10	50.00	8.93
21	0.50	0.0	50.00	2.83
22	0.50	0.0	50.00	0.69
23	0.50	0.0	25.00	0.96
24	0.50	0.25	25.00	4.15
25	0.67	0.33	10.00	0.98
26	0.67	0.33	1.00	0.10
27	0.67	0.33	1.00	0.11
28	0.67	0.33	1.00	0.02
29	0.67	0.33	1.00	0.02
30	0.67	0.33	1.00	0.03
31	0.67	0.33	1.00	0.02
32	0.67	0.33	1.00	0.01
33	0.67	0.33	1.00	0.09
34	0.67	0.33	1.00	0.09
35	0.67	0.33	1.00	0.09
36	0.67	0.33	1.00	0.10
37	0.67	0.33	1.00	0.12
38	0.67	0.33	1.00	0.02
39	0.67	0.33	1.00	0.11
40	0.67	0.33	1.00	0.03
41	0.67	0.33	1.00	0.03
42	0.67	0.33	1.00	0.03
43	0.67	0.33	1.00	0.09
44	0.67	0.33	1.00	0.02

45	0.67	0.33	1.00	0.03
46	0.67	0.33	1.00	0.02
47	0.67	0.33	1.00	0.12
48	0.67	0.33	1.00	0.11
49	0.67	0.33	1.00	0.02
50	0.67	0.33	1.00	0.02
51	0.67	0.33	1.00	0.01
52	0.67	0.33	1.00	0.10
53	0.67	0.33	1.00	0.12
54	0.67	0.33	1.00	0.01
55	0.67	0.33	1.00	0.14
56	0.67	0.33	1.00	0.10
57	0.67	0.33	1.00	0.04
58	0.67	0.33	1.00	0.01
59	0.67	0.33	1.00	0.07
60	0.67	0.33	1.00	0.02
61	0.67	0.33	1.00	0.08
62	0.67	0.33	1.00	0.01
63	0.67	0.33	1.00	0.09
64	0.67	0.33	1.00	0.08
65	0.67	0.33	1.00	0.08
66	0.67	0.33	1.00	0.01
67	0.67	0.33	1.00	0.06
68	0.67	0.33	1.00	0.06
69	0.67	0.33	1.00	0.07
70	0.67	0.33	1.00	0.01
71	0.67	0.33	1.00	0.07
72	0.67	0.33	1.00	0.06
73	0.67	0.33	1.00	0.03
74	0.67	0.33	1.00	0.02
75	0.67	0.33	1.00	0.06
76	0.67	0.33	1.00	0.06
77	0.67	0.33	1.00	0.04
78	0.67	0.33	1.00	0.03
79	0.67	0.33	1.00	0.00
80	0.67	0.33	1.00	0.02
81	0.67	0.33	1.00	0.02
82	0.67	0.33	1.00	0.03

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                        SECTION 3.0  SIMULATE WATER QUALITY CONDITIONS (MAIN QUALITY LOOP)

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RESTART DECK TAPE WAS LAST WRITTEN AFTER CYCLE  449
HYDRAULIC CYCLE ON EXTRACT TAPE FOR RESTARTING =   150
NTAG =   3



          THE TOTAL MASS (TONS) FOR EACH CONSTITUENT AT CYCLE  449 IS AS FOLLOWS

             452049895424.00

          THE TOTAL MASS (TONS) DEPLETED FOR EACH CONSTITUENT AS OF CYCLE  449 IS AS FOLLOWS

                     7064.96


RESTART DECK TAPE WAS LAST WRITTEN AFTER CYCLE  450
HYDRAULIC CYCLE ON EXTRACT TAPE FOR RESTARTING =   156
NTAG =   4



          THE TOTAL MASS (TONS) FOR EACH CONSTITUENT AT CYCLE  450 IS AS FOLLOWS

             451861413888.00

          THE TOTAL MASS (TONS) DEPLETED FOR EACH CONSTITUENT AS OF CYCLE  450 IS AS FOLLOWS

                    381812.00


RESTART DECK TAPE WAS LAST WRITTEN AFTER CYCLE  451
HYDRAULIC CYCLE ON EXTRACT TAPE FOR RESTARTING =   162
NTAG =   5
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          THE TOTAL MASS (TONS) FOR EACH CONSTITUENT AT CYCLE  451 IS AS FOLLOWS

             451672670208.00

          THE TOTAL MASS (TONS) DEPLETED FOR EACH CONSTITUENT AS OF CYCLE  451 IS AS FOLLOWS

                    381886.38


RESTART DECK TAPE WAS LAST WRITTEN AFTER CYCLE  452
HYDRAULIC CYCLE ON EXTRACT TAPE FOR RESTARTING =   168
NTAG =   6


          THE TOTAL MASS (TONS) FOR EACH CONSTITUENT AT CYCLE  452 IS AS FOLLOWS

             451484254208.00

          THE TOTAL MASS (TONS) DEPLETED FOR EACH CONSTITUENT AS OF CYCLE  452 IS AS FOLLOWS

                    913512.00


RESTART DECK TAPE WAS LAST WRITTEN AFTER CYCLE  453
HYDRAULIC CYCLE ON EXTRACT TAPE FOR RESTARTING =   174
NTAG =   7


          THE TOTAL MASS (TONS) FOR EACH CONSTITUENT AT CYCLE  453 IS AS FOLLOWS

             451295510528.00

          THE TOTAL MASS (TONS) DEPLETED FOR EACH CONSTITUENT AS OF CYCLE  453 IS AS FOLLOWS

                    913648.13


RESTART DECK TAPE WAS LAST WRITTEN AFTER CYCLE  454
HYDRAULIC CYCLE ON EXTRACT TAPE FOR RESTARTING =   180
NTAG =   8
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          THE TOTAL MASS (TONS) FOR EACH CONSTITUENT AT CYCLE  454 IS AS FOLLOWS

             451107094528.00

          THE TOTAL MASS (TONS) DEPLETED FOR EACH CONSTITUENT AS OF CYCLE  454 IS AS FOLLOWS

                  1124119.00


RESTART DECK TAPE WAS LAST WRITTEN AFTER CYCLE  455
HYDRAULIC CYCLE ON EXTRACT TAPE FOR RESTARTING =   186
NTAG =   9



          THE TOTAL MASS (TONS) FOR EACH CONSTITUENT AT CYCLE  455 IS AS FOLLOWS

             450918416384.00

          THE TOTAL MASS (TONS) DEPLETED FOR EACH CONSTITUENT AS OF CYCLE  455 IS AS FOLLOWS

                  1124119.00


RESTART DECK TAPE WAS LAST WRITTEN AFTER CYCLE  456
HYDRAULIC CYCLE ON EXTRACT TAPE FOR RESTARTING =   192
NTAG =  10



          THE TOTAL MASS (TONS) FOR EACH CONSTITUENT AT CYCLE  456 IS AS FOLLOWS

             450730065920.00

          THE TOTAL MASS (TONS) DEPLETED FOR EACH CONSTITUENT AS OF CYCLE  456 IS AS FOLLOWS

                  1124119.00


RESTART DECK TAPE WAS LAST WRITTEN AFTER CYCLE  457
HYDRAULIC CYCLE ON EXTRACT TAPE FOR RESTARTING =   198
NTAG =  11
```

THE TOTAL MASS (TONS) FOR EACH CONSTITUENT AT CYCLE 457 IS AS FOLLOWS

4505419778[illegible]0.00

THE TOTAL MASS (TONS) DEPLETED FOR EACH CONSTITUENT AS OF CYCLE 457 IS AS FOLLOWS

1124144.00

RESTART DECK TAPE WAS LAST WRITTEN AFTER CYCLE 458
HYDRAULIC CYCLE ON EXTRACT TAPE FOR RESTARTING = 204
NTAG = 12

THE TOTAL MASS (TONS) FOR EACH CONSTITUENT AT CYCLE 458 IS AS FOLLOWS

4503540858[illegible]8.00

THE TOTAL MASS (TONS) DEPLETED FOR EACH CONSTITUENT AS OF CYCLE 458 IS AS FOLLOWS

1126142.00

HIGH SLACK PREDICTIONS

JUNCTION NUMBER	HEAD (FT)	CONCENTRATION FACTORS 1ST. CONSTIT. (MGL)	2ND. CONSTIT. (MGL)	3RD. CONSTIT. (MGL)	4TH. CONSTIT. (MGL)	5TH. CONSTIT. (MGL)
		CYCLE 477	10 DAYS, 2.50 HOURS			
2	1.5904	0.00				
- 11	1.8325	0.00				
		CYCLE 478	10 DAYS, 3.00 HOURS			
12	1.4775	0.00				
13	1.8735	0.00				
- 20	2.1259	0.00				
		CYCLE 479	10 DAYS, 3.50 HOURS			
22	1.8641	0.0				
23	2.0806	0.00				
24	2.2608	0.00				
25	2.4318	0.00				
- 31	2.5808	0.00				
		CYCLE 480	10 DAYS, 4.00 HOURS			
32	2.1690	0.00				
33	2.3587	0.00				
34	2.5561	0.00				
36	2.7116	0.00				
- 38	2.8586	0.03				
		CYCLE 481	10 DAYS, 4.50 HOURS			
42	2.4548	0.07				
43	2.6389	0.16				
44	2.8642	0.24				
48	3.0215	0.27				
= 49	3.2049	0.29				
		CYCLE 482	10 DAYS, 5.00 HOURS			

51	2.8997	0.28	
52	3.0534	0.24	
55	3.1872	0.16	
56	3.3294	0.10	
58	3.4928	0.05	
59	3.6258	0.02	
60	3.7642	0.01	
	CYCLE 483		10 DAYS, 5.50 HOURS
62	3.5581	0.00	
63	3.7200	0.00	
64	3.9004	0.00	
66	4.0626	0.00	
68	4.2091	0.00	
69	4.3509	0.00	
70	4.4794	0.00	
71	4.5956	0.00	
72	4.6720	0.00	
	CYCLE 484		10 DAYS, 6.00 HOURS
74	4.3917	0.0	
75	4.4601	0.0	
76	4.5880	0.0	

RESTART DECK TAPE WAS LAST WRITTEN AFTER CYCLE 501
HYDRAULIC CYCLE ON EXTRACT TAPE FOR RESTARTING = 162
NTAG = 5

THE TOTAL MASS (TONS) FOR EACH CONSTITUENT AT CYCLE 501 IS AS FOLLOWS

442344079360.00

THE TOTAL MASS (TONS) DEPLETED FOR EACH CONSTITUENT AS OF CYCLE 501 IS AS FOLLOWS

3822787.00

HIGH SLACK PREDICTIONS

JUNCTION NUMBER	HEAD (FT)	CONCENTRATION FACTORS 1ST. CONSTIT. (MGL)	2ND. CONSTIT. (MGL)	3RD. CONSTIT. (MGL)	4TH. CONSTIT. (MGL)	5TH. CONSTIT. (MGL)
		CYCLE 527	11 DAYS, 3.50 HOURS			
2	1.5904	0.00				
- 11	1.8325	0.0				
		CYCLE 528	11 DAYS, 4.00 HOURS			
12	1.4775	0.00				
13	1.8735	0.00				
- 20	2.1259	0.0				
		CYCLE 529	11 DAYS, 4.50 HOURS			
22	1.8641	0.00				
23	2.0806	0.00				
24	2.2608	0.00				
25	2.4318	0.00				
- 31	2.5808	0.00				
		CYCLE 530	11 DAYS, 5.00 HOURS			
32	2.1690	0.00				
33	2.3587	0.0				
34	2.5561	0.01				
36	2.7116	0.03				
- 38	2.8586	0.08				
		CYCLE 531	11 DAYS, 5.50 HOURS			
42	2.4548	0.14				
43	2.6389	0.21				
44	2.8642	0.25				
48	3.0215	0.26				
= 49	3.2049	0.26				
		CYCLE 532	11 DAYS, 6.00 HOURS			

51	2.8997	0.21	
52	3.0534	0.16	
55	3.1872	0.10	
56	3.3294	0.05	
58	3.4928	0.02	
59	3.6258	0.01	
- 60	3.7642	0.00	
	CYCLE 533	11 DAYS, 6.50 HOURS	
62	3.5581	0.00	
63	3.7200	0.00	
64	3.9004	0.00	
66	4.0626	0.00	
68	4.2091	0.00	
69	4.3509	0.00	
70	4.4794	0.00	
71	4.5956	0.00	
= 72	4.6720	0.00	
	CYCLE 534	11 DAYS, 7.00 HOURS	
74	4.3917	0.0	
75	4.4601	0.0	
76	4.5880	0.0	

RESTART DECK TAPE WAS LAST WRITTEN AFTER CYCLE 551
HYDRAULIC CYCLE ON EXTRACT TAPE FOR RESTARTING = 162
NTAG = 5

THE TOTAL MASS (TONS) FOR EACH CONSTITUENT AT CYCLE 551 IS AS FOLLOWS

433209606144.00

THE TOTAL MASS (TONS) DEPLETED FOR EACH CONSTITUENT AS OF CYCLE 551 IS AS FOLLOWS

6293070.00

HIGH SLACK PREDICTIONS

JUNCTION NUMBER	HEAD (FT)	CONCENTRATION FACTORS 1ST. CONSTIT. (MGL)	2ND. CONSTIT. (MGL)	3RD. CONSTIT. (MGL)	4TH. CONSTIT. (MGL)	5TH. CONSTIT. (MGL)
		CYCLE 577	12 DAYS, 4.50 HOURS			
2	1.5904	0.00				
- 11	1.8325	0.00				
		CYCLE 578	12 DAYS, 5.00 HOURS			
12	1.4775	0.00				
13	1.8735	0.00				
- 20	2.1259	0.00				
		CYCLE 579	12 DAYS, 5.50 HOURS			
22	1.8641	0.00				
23	2.0806	0.00				
24	2.2608	0.00				
25	2.4318	0.00				
- 31	2.5808	0.00				
		CYCLE 580	12 DAYS, 6.00 HOURS			
32	2.1690	0.0				
33	2.3587	0.00				
34	2.5561	0.04				
36	2.7116	0.08				
- 38	2.8586	0.14				
		CYCLE 581	12 DAYS, 6.50 HOURS			
42	2.4548	0.19				
43	2.6389	0.23				
44	2.8642	0.24				
48	3.0215	0.23				
= 49	3.2049	0.20				
		CYCLE 582	12 DAYS, 7.00 HOURS			

51	2.8997	0.15	
52	3.0534	0.10	
55	3.1872	0.05	
56	3.3294	0.02	
58	3.4928	0.01	
59	3.6258	0.00	
- 60	3.7642	0.00	
	CYCLE 583	12 DAYS. 7.50 HOURS	
62	3.5581	0.00	
63	3.7200	0.00	
64	3.9004	0.00	
66	4.0626	0.00	
68	4.2091	0.00	
69	4.3509	0.00	
70	4.4794	0.00	
71	4.5956	0.00	
* 72	4.6720	0.00	
	CYCLE 584	12 DAYS. 0.00 HOURS	
74	4.3917	0.00	
75	4.4601	0.0	
76	4.5880	0.0	

RESTART DECK TAPE WAS LAST WRITTEN AFTER CYCLE 590
HYDRAULIC CYCLE ON EXTRACT TAPE FOR RESTARTING = 294
NTAG = 2

THE TOTAL MASS (TONS) FOR EACH CONSTITUENT AT CYCLE 590 IS AS FOLLOWS

424796684288.00

THE TOTAL MASS (TONS) DEPLETED FOR EACH CONSTITUENT AS OF CYCLE 590 IS AS FOLLOWS

7959312.00

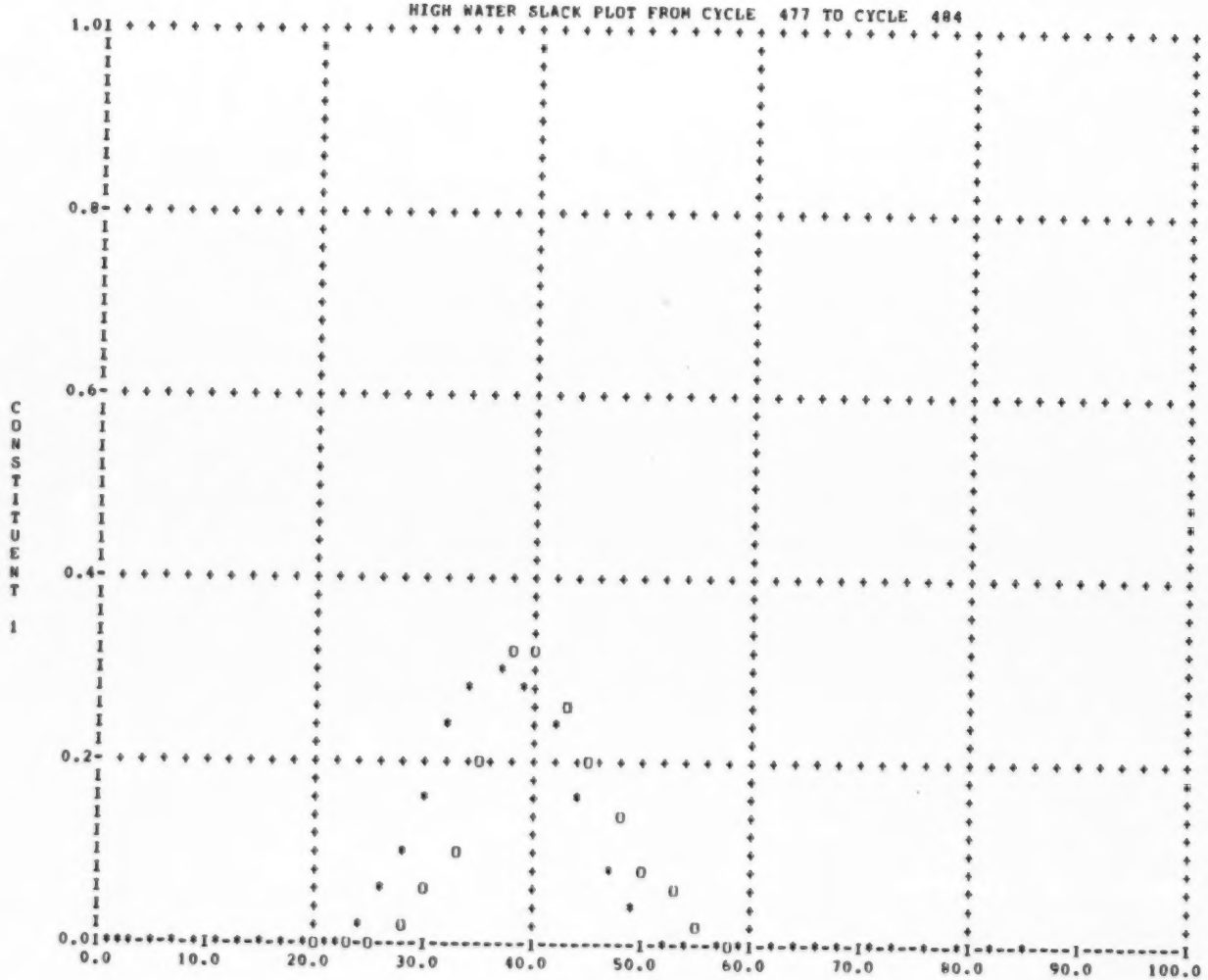
END OF QUALITY RUN. 598 CYCLES.

THE FOLLOWING DEPLETION CORRECTIONS (MG/L * CU FT) WERE ACCUMULATED FOR CONSTITUENT 1

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5.	20.	6.	0.	0.	0.	0.	0.	0.	3.
5.	1.	357.	1532.	3587.	0.	0.	0.	0.	4.
4061.	7537.	12172.	3810.	0.	905.	0.	0.	0.	0.
0.	0.	0.	0.	0.	12.	45.	0.	0.	0.
0.	0.	0.	0.	0.	0.	19.	0.	80.	45.
6.	2.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.				

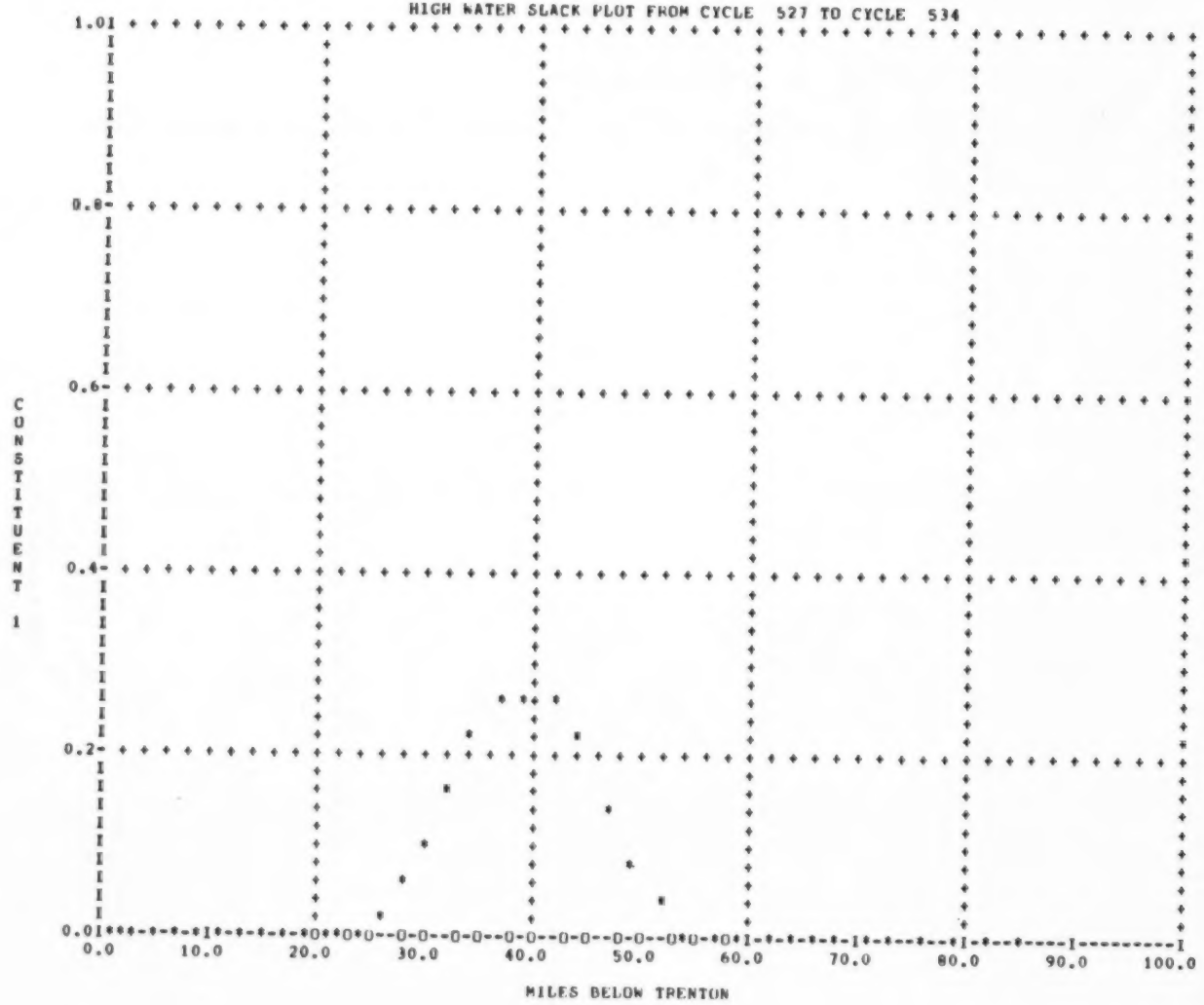
DELAWARE ESTUARY CENTER CHANNEL

HIGH WATER SLACK PLOT FROM CYCLE 477 TO CYCLE 484



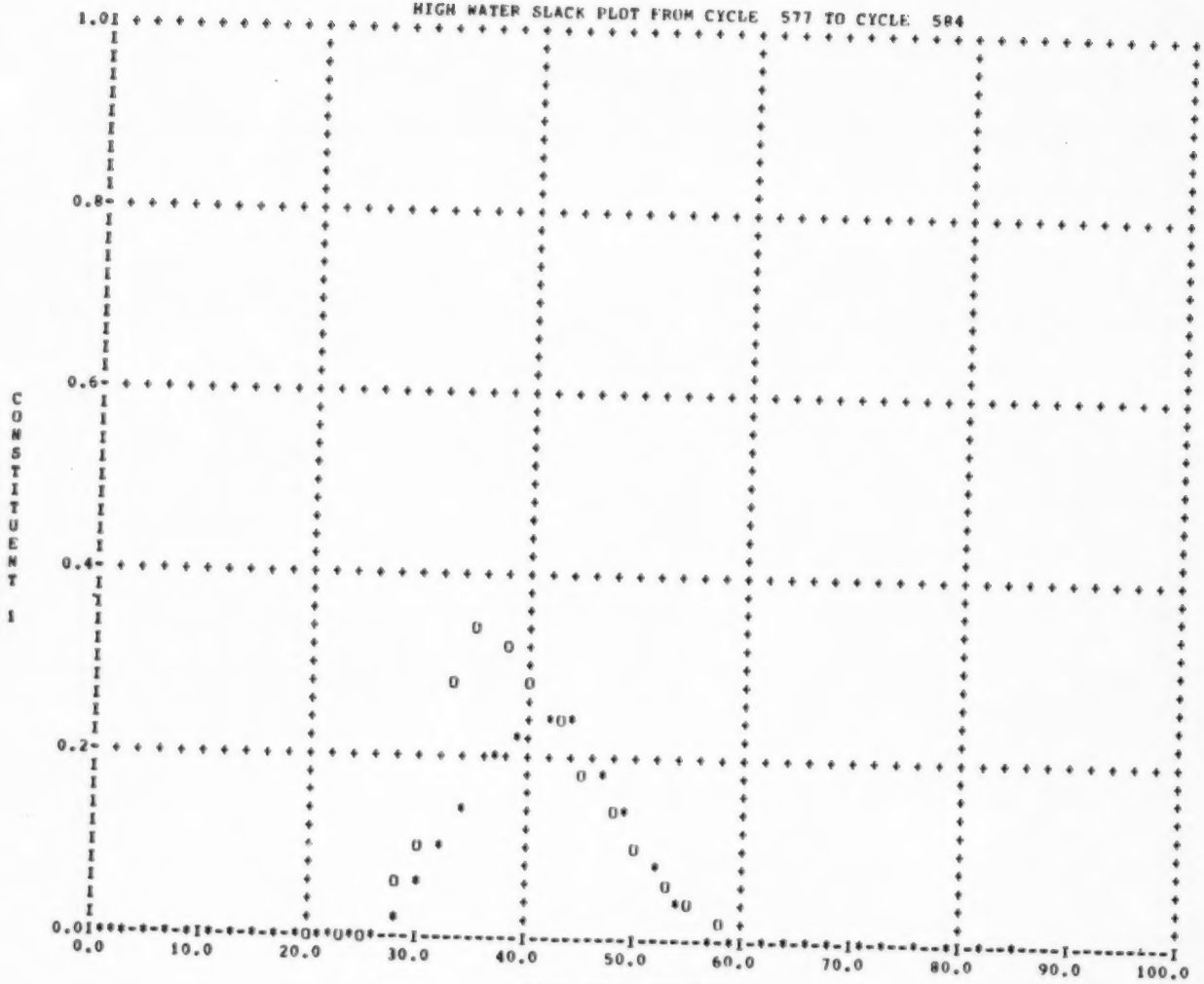
DELAWARE ESTUARY CENTER CHANNEL

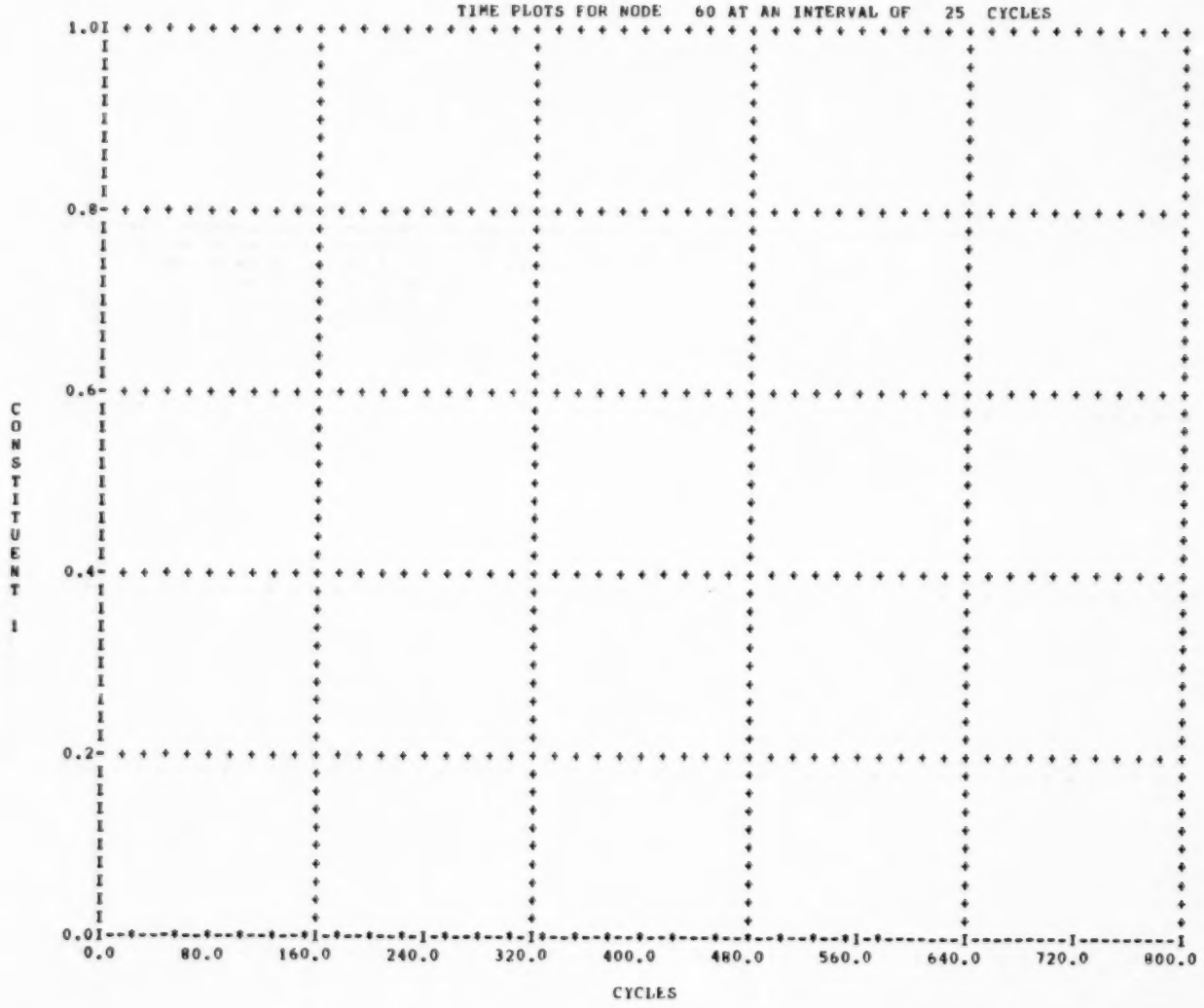
HIGH WATER SLACK PLOT FROM CYCLE 527 TO CYCLE 534

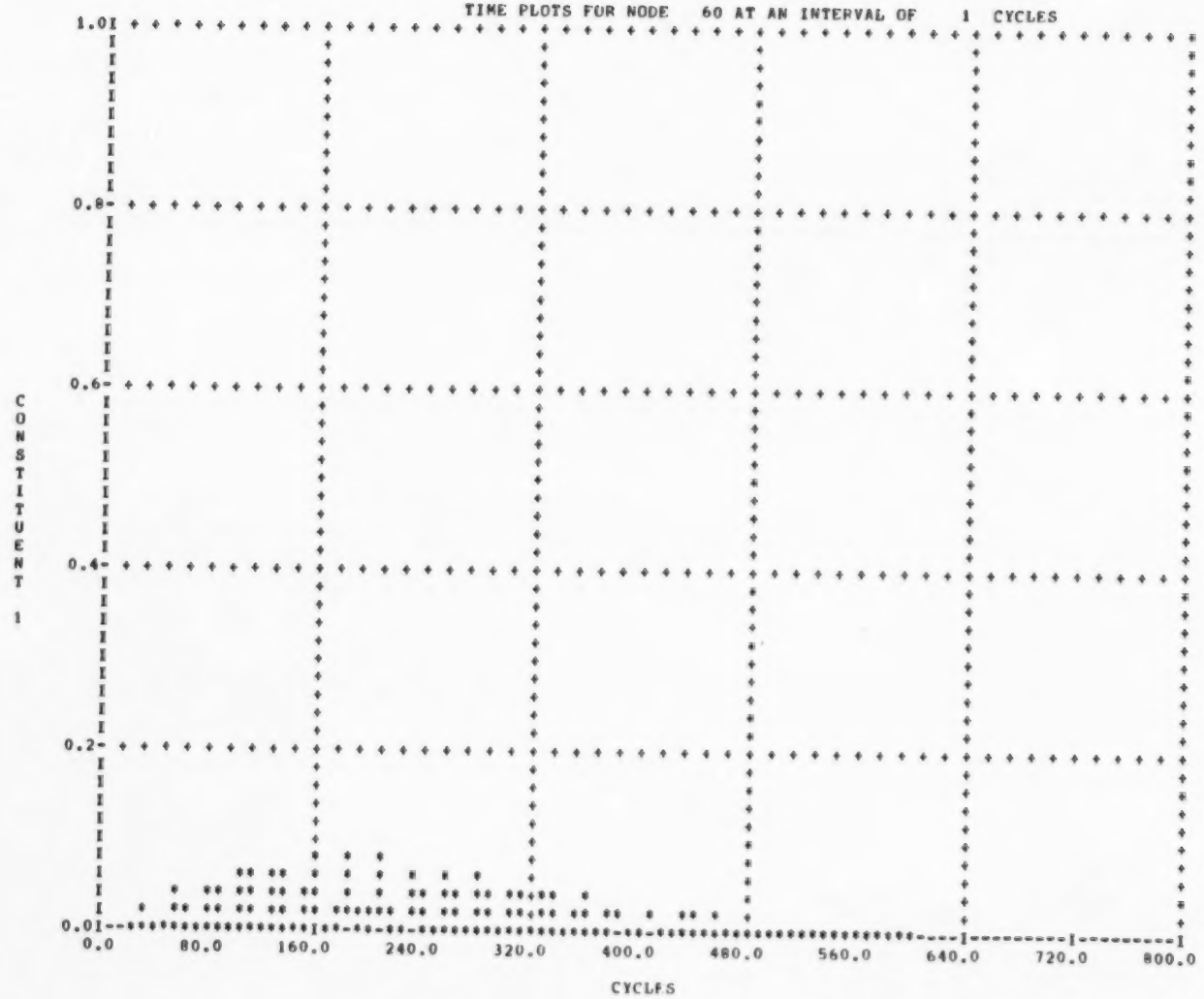


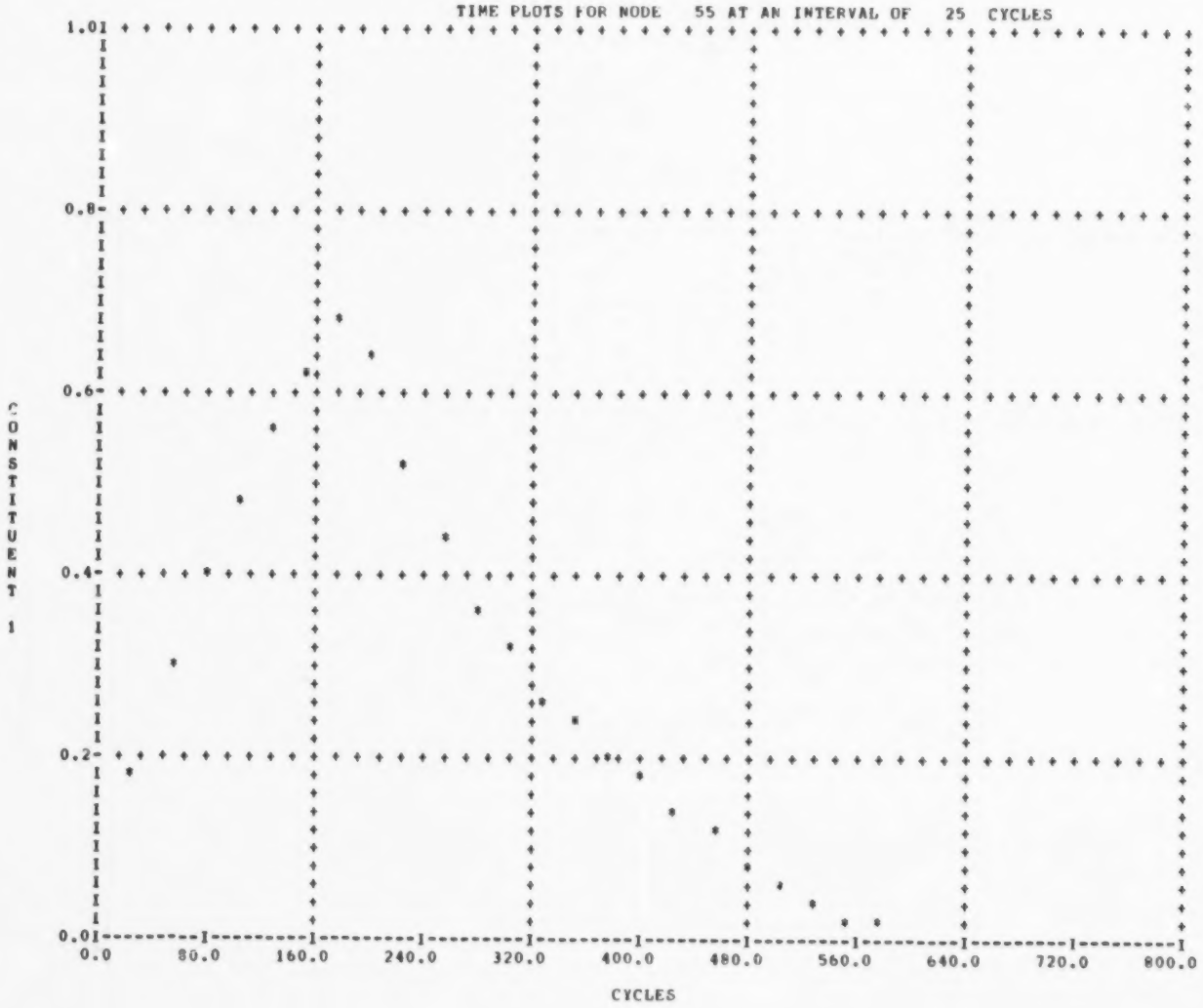
DELAWARE ESTUARY CENTER CHANNEL

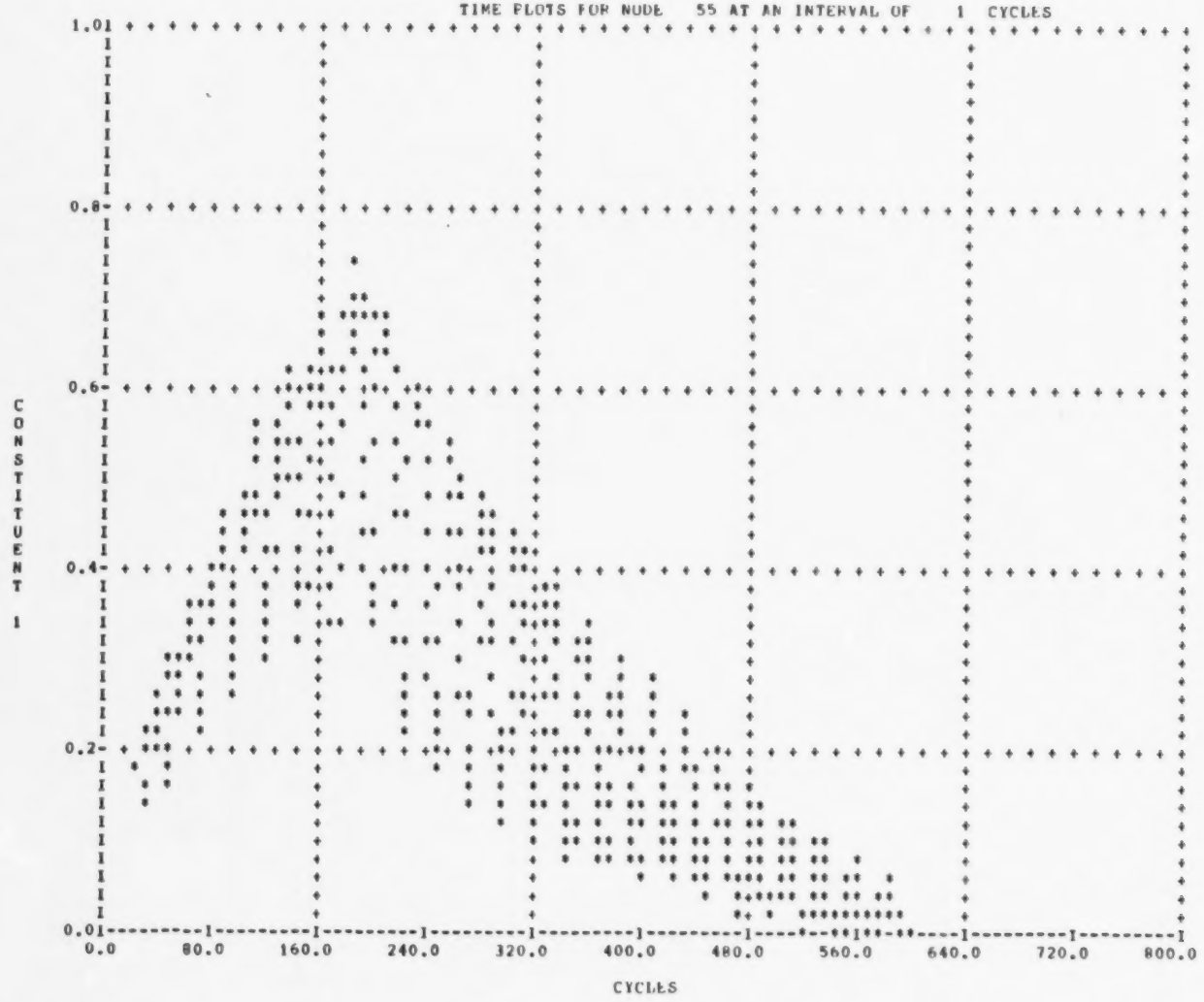
HIGH WATER SLACK PLOT FROM CYCLE 577 TO CYCLE 584




TIME PLOTS FOR NODE 60 AT AN INTERVAL OF 25 CYCLES
CONSTITUENT 1
1.0
0.8
0.6
0.4
0.2
0.0
0.0
80.0
160.0
240.0
320.0
400.0
480.0
560.0
640.0
720.0
800.0
CYCLES


TIME PLOTS FOR NODE 60 AT AN INTERVAL OF 1 CYCLES
1.0
0.8
0.6
0.4
0.2
0.0
CONSTITUENT 1
0.0
80.0
160.0
240.0
320.0
400.0
480.0
560.0
640.0
720.0
800.0
CYCLES


TIME PLOTS FOR NODE 55 AT AN INTERVAL OF 25 CYCLES
1.01
0.8
0.6
0.4
0.2
0.01
CONSTITUENT 1
0.0
80.0
160.0
240.0
320.0
400.0
480.0
560.0
640.0
720.0
800.0
CYCLES


TIME PLOTS FOR NODE 55 AT AN INTERVAL OF 1 CYCLES
CONSTITUENT 1
1.0
0.8
0.6
0.4
0.2
0.0
0.0
80.0
160.0
240.0
320.0
400.0
480.0
560.0
640.0
720.0
800.0
CYCLES

*

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SECTION 2.1 SF1 PROGRAM CONTROL OPTIONS

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DELAWARE ESTUARY (INCLUDING C&D CANAL) HYDRAULIC MODEL ** (76 JUNCTIONS)
DELAWARE RIVER FLOW = 7880 CFS ** SCHUYLKILL RIVER FLOW =2067 CFS
DELAWARE ESTUARY 1-D NETWORK, TRENTON-LISTON POINT, DELAWARE R FLOW = 7680 CFS
SIMULATION PERIOD : AUGUST 1 - 15 , 1975

ENVIRONMENTAL PROTECTION AGENCY
DYNAMIC WATER QUALITY MODEL

THIS SIMULATION BEGINS AT 0.0 HOURS
SUNRISE AND SUNSET OCCUR AT 6.00 AND 18.00 HOURS,RESPECTIVELY

******** FROM HYDRAULICS PROGRAM ********

START CYCLE	STOP CYCLE	TIME INTERVAL
150	300	300. SECONDS

STARTING CYCLE ON HYD EXT TAPE	INITIAL QUALITY CYCLE	TOTAL QUALITY CYCLES	DEPLETION CORRECT OPTION	TIME INTERVAL IN QUALITY PROGRAM	START OF FLOOD	START OF EBB	DURATION OF FLOOD	END OF EBB
168	1	1201	2	0.500 HOURS	18	4	11	17

RIVER MILES FOR MODEL NETWORK

NODE	RM	NODE	RM	NODE	RM	NODE	RM	NODE	RM	NODE	RM
1	94.0	14	86.0	27	96.0	40	86.0	53	31.0	66	15.2
2	84.8	15	87.0	28	97.0	41	45.0	54	91.0	67	14.0
3	93.0	16	88.0	29	98.0	42	46.8	55	29.8	68	13.1
4	92.0	17	89.0	30	99.0	43	44.4	56	28.0	69	11.2
5	91.0	18	74.0	31	61.6	44	41.5	57	92.0	70	8.9
6	90.0	19	75.0	32	58.7	45	87.0	58	26.0	71	6.5
7	89.0	20	73.2	33	56.5	46	88.0	59	24.3	72	4.8
8	88.0	21	72.0	34	53.8	47	89.0	60	22.3	73	94.0
9	87.0	22	70.8	35	53.0	48	39.2	61	93.0	74	3.2
10	86.0	23	68.3	36	51.6	49	36.7	62	20.6	75	1.8
11	81.9	24	65.7	37	50.0	50	90.0	63	18.8	76	0.5
12	78.9	25	63.5	38	49.0	51	34.4	64	17.0		
13	76.0	26	95.0	39	48.0	52	32.2	65	90.0		

DATA IS TRANSFORMED FOR OUTPUT AS FOLLOWS

SEQUENCE	TRANSFORMATION OPERATION	TRANSFORMED CONSTITUENTS			TRANSF. FACTORS FOR OLD CONSTITUENTS				
					CONST1	CONST2	CONST3	CONST4	CONST5
1	MULTIPLICATION	1	-	5	1000.00	1000.00	0.0	0.0	0.0
2	ADDITION	3	AND	0	1	2	0	0	0
3	LOG (BASE 10)	1	-	5	1	1	1	0	0

THE FOLLOWING 8 JUNCTIONS HAVE TIME PLOTS

JUNCTION	STARTING CYCLE	ENDING CYCLE	CYCLE INTERVAL (1=PLOT 0=NO PLOT)	CON1	CON2	CON3	CON4	CON5
25	1	1200	50	0	0	1	0	0
25	800	1200	1	0	0	1	0	0
36	1	1200	50	0	0	1	0	0
36	800	1200	1	0	0	1	0	0
52	1	1200	50	0	0	1	0	0
52	800	1200	1	0	0	1	0	0
66	1	1200	50	0	0	1	0	0
66	800	1200	1	0	0	1	0	0

SECTION 2.2 DEFINE WATER QUALITY CONSTITUENTS

THIS RUN CONSIDERS 2 CONSTITUENTS

CONSTITUENT 1 IS DECAYING FECAL COLIFORM (MPN/100ML)

CONSTITUENT 2 IS RESISTANT FECAL COLIFORM (MPN/100ML)

***** TABLE OF TRANSFER COEFFICIENTS AND FUNCTION OPERATORS *****

CNST(K)	CO(1,K)	CO(2,K)	CO(3,K)	CO(4,K)	CO(5,K)	FUNC1	FUNC2	FUNC3	FUNC4	FUNC5	FUNC6	FUNC7	FUNC8	FUNC9	FUNC10	FUNC11	FUNC12
1	-1.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	-1.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

THE TEMPERATURE FROM CYCLE 1 THROUGH CYCLE 2400 IS 27.0 DEGREES C

TABLE OF DECAY RATES (AT 20. C)

SIMULATION PERIOD : AUGUST 1 - 15 , 1975

CONSTITUENT 1 IS DECAYING FECAL COLIFORM (MPN/100ML)

CONSTITUENT 2 IS RESISTANT FECAL COLIFORM (MPN/100ML)

	******** PRIMARY DECAY RATES 1/DAY (BASE E) *******					SECONDARY DECAY 1/DAY	
NODE	CONST1	CONST2	CONST3	CONST4	CONST5	CONST6	CONST6
1	4.000	0.150	0.0	0.0	0.0	0.0	0.0
2	4.000	0.150	0.0	0.0	0.0	0.0	0.0
3	4.000	0.150	0.0	0.0	0.0	0.0	0.0
4	4.000	0.150	0.0	0.0	0.0	0.0	0.0
5	4.000	0.150	0.0	0.0	0.0	0.0	0.0
6	4.000	0.150	0.0	0.0	0.0	0.0	0.0
7	4.000	0.150	0.0	0.0	0.0	0.0	0.0
8	4.000	0.150	0.0	0.0	0.0	0.0	0.0
9	4.000	0.150	0.0	0.0	0.0	0.0	0.0
10	4.000	0.150	0.0	0.0	0.0	0.0	0.0
11	4.000	0.150	0.0	0.0	0.0	0.0	0.0
12	4.000	0.150	0.0	0.0	0.0	0.0	0.0
13	4.000	0.150	0.0	0.0	0.0	0.0	0.0
14	4.000	0.150	0.0	0.0	0.0	0.0	0.0
15	4.000	0.150	0.0	0.0	0.0	0.0	0.0
16	4.000	0.150	0.0	0.0	0.0	0.0	0.0
17	4.000	0.150	0.0	0.0	0.0	0.0	0.0
18	4.000	0.150	0.0	0.0	0.0	0.0	0.0
19	4.000	0.150	0.0	0.0	0.0	0.0	0.0
20	4.000	0.150	0.0	0.0	0.0	0.0	0.0
21	4.000	0.150	0.0	0.0	0.0	0.0	0.0
22	4.000	0.150	0.0	0.0	0.0	0.0	0.0
23	4.000	0.150	0.0	0.0	0.0	0.0	0.0
24	4.000	0.150	0.0	0.0	0.0	0.0	0.0
25	4.000	0.150	0.0	0.0	0.0	0.0	0.0
26	4.000	0.150	0.0	0.0	0.0	0.0	0.0
27	4.000	0.150	0.0	0.0	0.0	0.0	0.0
28	4.000	0.150	0.0	0.0	0.0	0.0	0.0
29	4.000	0.150	0.0	0.0	0.0	0.0	0.0
30	4.000	0.150	0.0	0.0	0.0	0.0	0.0
31	4.000	0.150	0.0	0.0	0.0	0.0	0.0
32	4.000	0.150	0.0	0.0	0.0	0.0	0.0
33	4.000	0.150	0.0	0.0	0.0	0.0	0.0
34	4.000	0.150	0.0	0.0	0.0	0.0	0.0
35	4.000	0.150	0.0	0.0	0.0	0.0	0.0
36	4.000	0.150	0.0	0.0	0.0	0.0	0.0
37	4.000	0.150	0.0	0.0	0.0	0.0	0.0
38	4.000	0.150	0.0	0.0	0.0	0.0	0.0
39	4.000	0.150	0.0	0.0	0.0	0.0	0.0
40	4.000	0.150	0.0	0.0	0.0	0.0	0.0

41	4.000	0.150	0.0	0.0	0.0	0.0	0.0
42	4.000	0.150	0.0	0.0	0.0	0.0	0.0
43	4.000	0.150	0.0	0.0	0.0	0.0	0.0
44	4.000	0.150	0.0	0.0	0.0	0.0	0.0
45	4.000	0.150	0.0	0.0	0.0	0.0	0.0
46	4.000	0.150	0.0	0.0	0.0	0.0	0.0
47	4.000	0.150	0.0	0.0	0.0	0.0	0.0
48	4.000	0.150	0.0	0.0	0.0	0.0	0.0
49	4.000	0.150	0.0	0.0	0.0	0.0	0.0
50	4.000	0.150	0.0	0.0	0.0	0.0	0.0
51	4.000	0.150	0.0	0.0	0.0	0.0	0.0
52	4.000	0.150	0.0	0.0	0.0	0.0	0.0
53	4.000	0.150	0.0	0.0	0.0	0.0	0.0
54	4.000	0.150	0.0	0.0	0.0	0.0	0.0
55	4.000	0.150	0.0	0.0	0.0	0.0	0.0
56	4.000	0.150	0.0	0.0	0.0	0.0	0.0
57	4.000	0.150	0.0	0.0	0.0	0.0	0.0
58	4.000	0.150	0.0	0.0	0.0	0.0	0.0
59	4.000	0.150	0.0	0.0	0.0	0.0	0.0
60	4.000	0.150	0.0	0.0	0.0	0.0	0.0
61	4.000	0.150	0.0	0.0	0.0	0.0	0.0
62	4.000	0.150	0.0	0.0	0.0	0.0	0.0
63	4.000	0.150	0.0	0.0	0.0	0.0	0.0
64	4.000	0.150	0.0	0.0	0.0	0.0	0.0
65	4.000	0.150	0.0	0.0	0.0	0.0	0.0
66	4.000	0.150	0.0	0.0	0.0	0.0	0.0
67	4.000	0.150	0.0	0.0	0.0	0.0	0.0
68	4.000	0.150	0.0	0.0	0.0	0.0	0.0
69	4.000	0.150	0.0	0.0	0.0	0.0	0.0
70	4.000	0.150	0.0	0.0	0.0	0.0	0.0
71	4.000	0.150	0.0	0.0	0.0	0.0	0.0
72	4.000	0.150	0.0	0.0	0.0	0.0	0.0
73	4.000	0.150	0.0	0.0	0.0	0.0	0.0
74	4.000	0.150	0.0	0.0	0.0	0.0	0.0
75	4.000	0.150	0.0	0.0	0.0	0.0	0.0
76	4.000	0.150	0.0	0.0	0.0	0.0	0.0

TEMPERATURE CORRECTION FACTORS , THETA

1.000	1.000	1.000	1.000	1.000	1.000	1.000

TABLE OF DECAY RATES (AT 27. C)

SIMULATION PERIOD : AUGUST 1 - 15 , 1975

CONSTITUENT 1 IS DECAYING FECAL COLIFORM (MPN/100ML)

CONSTITUENT 2 IS RESISTANT FECAL COLIFORM (MPN/100ML)

	******** PRIMARY DECAY RATES 1/DAY (BASE E) *******					SECONDARY DECAY 1/DAY	
NODE	CONST1	CONST2	CONST3	CONST4	CONST5	CONST6	CONST7
1	4.000	0.150	0.0	0.0	0.0	0.0	0.0
2	4.000	0.150	0.0	0.0	0.0	0.0	0.0
3	4.000	0.150	0.0	0.0	0.0	0.0	0.0
4	4.000	0.150	0.0	0.0	0.0	0.0	0.0
5	4.000	0.150	0.0	0.0	0.0	0.0	0.0
6	4.000	0.150	0.0	0.0	0.0	0.0	0.0
7	4.000	0.150	0.0	0.0	0.0	0.0	0.0
8	4.000	0.150	0.0	0.0	0.0	0.0	0.0
9	4.000	0.150	0.0	0.0	0.0	0.0	0.0
10	4.000	0.150	0.0	0.0	0.0	0.0	0.0
11	4.000	0.150	0.0	0.0	0.0	0.0	0.0
12	4.000	0.150	0.0	0.0	0.0	0.0	0.0
13	4.000	0.150	0.0	0.0	0.0	0.0	0.0
14	4.000	0.150	0.0	0.0	0.0	0.0	0.0
15	4.000	0.150	0.0	0.0	0.0	0.0	0.0
16	4.000	0.150	0.0	0.0	0.0	0.0	0.0
17	4.000	0.150	0.0	0.0	0.0	0.0	0.0
18	4.000	0.150	0.0	0.0	0.0	0.0	0.0
19	4.000	0.150	0.0	0.0	0.0	0.0	0.0
20	4.000	0.150	0.0	0.0	0.0	0.0	0.0
21	4.000	0.150	0.0	0.0	0.0	0.0	0.0
22	4.000	0.150	0.0	0.0	0.0	0.0	0.0
23	4.000	0.150	0.0	0.0	0.0	0.0	0.0
24	4.000	0.150	0.0	0.0	0.0	0.0	0.0
25	4.000	0.150	0.0	0.0	0.0	0.0	0.0
26	4.000	0.150	0.0	0.0	0.0	0.0	0.0
27	4.000	0.150	0.0	0.0	0.0	0.0	0.0
28	4.000	0.150	0.0	0.0	0.0	0.0	0.0
29	4.000	0.150	0.0	0.0	0.0	0.0	0.0
30	4.000	0.150	0.0	0.0	0.0	0.0	0.0
31	4.000	0.150	0.0	0.0	0.0	0.0	0.0
32	4.000	0.150	0.0	0.0	0.0	0.0	0.0
33	4.000	0.150	0.0	0.0	0.0	0.0	0.0
34	4.000	0.150	0.0	0.0	0.0	0.0	0.0
35	4.000	0.150	0.0	0.0	0.0	0.0	0.0
36	4.000	0.150	0.0	0.0	0.0	0.0	0.0
37	4.000	0.150	0.0	0.0	0.0	0.0	0.0
38	4.000	0.150	0.0	0.0	0.0	0.0	0.0
39	4.000	0.150	0.0	0.0	0.0	0.0	0.0
40	4.000	0.150	0.0	0.0	0.0	0.0	0.0

41	4.000	0.150	0.0	0.0	0.0	0.0	0.0
42	4.000	0.150	0.0	0.0	0.0	0.0	0.0
43	4.000	0.150	0.0	0.0	0.0	0.0	0.0
44	4.000	0.150	0.0	0.0	0.0	0.0	0.0
45	4.000	0.150	0.0	0.0	0.0	0.0	0.0
46	4.000	0.150	0.0	0.0	0.0	0.0	0.0
47	4.000	0.150	0.0	0.0	0.0	0.0	0.0
48	4.000	0.150	0.0	0.0	0.0	0.0	0.0
49	4.000	0.150	0.0	0.0	0.0	0.0	0.0
50	4.000	0.150	0.0	0.0	0.0	0.0	0.0
51	4.000	0.150	0.0	0.0	0.0	0.0	0.0
52	4.000	0.150	0.0	0.0	0.0	0.0	0.0
53	4.000	0.150	0.0	0.0	0.0	0.0	0.0
54	4.000	0.150	0.0	0.0	0.0	0.0	0.0
55	4.000	0.150	0.0	0.0	0.0	0.0	0.0
56	4.000	0.150	0.0	0.0	0.0	0.0	0.0
57	4.000	0.150	0.0	0.0	0.0	0.0	0.0
58	4.000	0.150	0.0	0.0	0.0	0.0	0.0
59	4.000	0.150	0.0	0.0	0.0	0.0	0.0
60	4.000	0.150	0.0	0.0	0.0	0.0	0.0
61	4.000	0.150	0.0	0.0	0.0	0.0	0.0
62	4.000	0.150	0.0	0.0	0.0	0.0	0.0
63	4.000	0.150	0.0	0.0	0.0	0.0	0.0
64	4.000	0.150	0.0	0.0	0.0	0.0	0.0
65	4.000	0.150	0.0	0.0	0.0	0.0	0.0
66	4.000	0.150	0.0	0.0	0.0	0.0	0.0
67	4.000	0.150	0.0	0.0	0.0	0.0	0.0
68	4.000	0.150	0.0	0.0	0.0	0.0	0.0
69	4.000	0.150	0.0	0.0	0.0	0.0	0.0
70	4.000	0.150	0.0	0.0	0.0	0.0	0.0
71	4.000	0.150	0.0	0.0	0.0	0.0	0.0
72	4.000	0.150	0.0	0.0	0.0	0.0	0.0
73	4.000	0.150	0.0	0.0	0.0	0.0	0.0
74	4.000	0.150	0.0	0.0	0.0	0.0	0.0
75	4.000	0.150	0.0	0.0	0.0	0.0	0.0
76	4.000	0.150	0.0	0.0	0.0	0.0	0.0

TEMPERATURE CORRECTION FACTORS , THETA

1.000	1.000	1.000	1.000	1.000	1.000	1.000

SECTION 2.3 SPECIFY WASTEWATER AND TRIBUTARY LOADS

SUMMARY OF POINT SOURCE INPUTS

SIMULATION PERIOD : AUGUST 1 - 15 , 1975

CONSTITUENT 1 IS DECAYING FECAL COLIFORM (MPN/100ML)

CONSTITUENT 2 IS RESISTANT FECAL COLIFORM (MPN/100ML)

MUNICIPAL AND INDUSTRIAL WASTEWATER AND TRIBUTARY INFLOW BY NODE

INPUT NODE	NAME OF DISCHARGE	TYPE OF DISCHARGE	******* FLOW ******* MGD	CFS	UNADJUSTED CONC (MG/L) + ADJ. FACTORS CONST1	CONST2	CONST3	CONST4	CONST5	ADJUSTED INPUT LOADS - 1000 LB/DAY CONST1	CONST2	CONST3	CONST4	CONST5
21	GETTYUIL	IND	-7.90		17.50	17.50	17.50	17.50	17.50					
				-12.24	0.10	0.00	0.10	0.00	0.00	0.11	0.00	0.0	0.0	0.0
	NODE TOTAL			-12.24						0.11	0.00	0.0	0.0	0.0
24	IC1 001	IND	-2.60		15.00	15.00	15.00	15.00	15.00					
				-4.03	0.10	0.00	0.10	0.00	0.00	0.03	0.00	0.0	0.0	0.0
24	IC1 007	IND	-1.00		42.00	42.00	42.00	42.00	42.00					
				-1.55	0.99	0.00	1.00	0.00	0.00	0.35	0.00	0.0	0.0	0.0
	NODE TOTAL			-5.58						0.38	0.00	0.0	0.0	0.0
25	WLMINGTN	MUN	-125.90		40.00	40.00	40.00	40.00	40.00					
				-195.14	9.95	0.05	9.97	0.03	0.04	418.24	2.10	0.0	0.0	0.0
	NODE TOTAL			-195.14						418.24	2.10	0.0	0.0	0.0
29	CHRISTIN	TRIB	-169.03		52.00	52.00	52.00	52.00	52.00					
				-262.00	0.07	0.02	0.07	0.02	0.02	5.50	1.83	0.0	0.0	0.0
	NODE TOTAL			-262.00						5.50	1.83	0.0	0.0	0.0
30	BRNDYWIN	TRIB	-334.19		12.00	12.00	12.00	12.00	12.00					
				-518.00	0.07	0.02	0.07	0.02	0.02	2.51	0.84	0.0	0.0	0.0

	NODE TOTAL			-518.00						2.51	0.84	0.0	0.0	0.0
34	SUN OIL	IND		-88.00		16.00	16.00	16.00	16.00	16.00					
					-136.40	0.10	0.00	0.10	0.00	0.00	1.17	0.01	0.0	0.0	0.0
34	BP OIL	IND		-49.00		19.00	19.00	19.00	19.00	19.00					
					-75.95	0.10	0.00	0.10	0.00	0.00	0.77	0.00	0.0	0.0	0.0
	NODE TOTAL			-212.35							1.94	0.01	0.0	0.0	0.0
36	CHESIR C	TRIB		-53.55		53.00	53.00	53.00	53.00	53.00					
					-83.00	0.07	0.02	0.07	0.02	0.02	1.78	0.59	0.0	0.0	0.0
	NODE TOTAL			-83.00							1.78	0.59	0.0	0.0	0.0
40	CDCA	MUN		-9.70		21.00	21.00	21.00	21.00	21.00					
					-15.03	99.50	0.50	99.70	0.30	0.40	169.17	0.85	0.0	0.0	0.0
40	DARBY CR	TRIB		-38.71		30.00	30.00	30.00	30.00	30.00					
					-60.00	0.07	0.02	0.07	0.02	0.02	0.73	0.24	0.0	0.0	0.0
	NODE TOTAL			-75.03							169.90	1.09	0.0	0.0	0.0
44	PHILA SW	MUN		-173.00		23.00	23.00	23.00	23.00	23.00					
					-268.15	99.50	0.50	99.70	0.30	0.40	3304.56	16.61	0.0	0.0	0.0
	NODE TOTAL			-268.15							3304.56	16.61	0.0	0.0	0.0
47	SCHULKIL	TRIB		-1333.55		7.50	7.50	7.50	7.50	7.50					
					-2067.00	0.01	0.00	0.01	0.00	0.00	0.63	0.21	0.0	0.0	0.0
	NODE TOTAL			-2067.00							0.63	0.21	0.0	0.0	0.0
49	PHILA SE	MUN		-125.00		58.00	58.00	58.00	58.00	58.00					
					-193.75	99.50	0.50	99.70	0.30	0.40	6021.13	30.26	0.0	0.0	0.0
49	CAMDEN M	MUN		-21.90		10.00	10.00	10.00	10.00	10.00					
					-33.94	99.50	0.50	99.70	0.30	0.40	181.88	0.91	0.0	0.0	0.0
	NODE TOTAL			-227.69							6203.00	31.17	0.0	0.0	0.0
54	CAMDEN N	MUN		-3.90		10.00	10.00	10.00	10.00	10.00					
					-6.04	99.50	0.50	99.70	0.30	0.40	32.39	0.16	0.0	0.0	0.0
54	COOPER R	TRIB		-20.65		21.00	21.00	21.00	21.00	21.00					
					-32.00	0.75	0.25	0.75	0.25	0.25	2.71	0.90	0.0	0.0	0.0
	NODE TOTAL			-38.04							35.10	1.07	0.0	0.0	0.0

55	PHILA NE	MUN	-199.00		30.00	30.00	30.00	30.00	30.00						
				-308.45	99.50	0.50	99.70	0.30	0.40	4958.08	24.91	0.0	0.0	0.0	
	NODE TOTAL			-308.45						4958.08	24.91	0.0	0.0	0.0	
59	PENYPACK	TRIB	-25.81		56.00	56.00	56.00	56.00	56.00						
				-40.00	0.07	0.02	0.07	0.02	0.02	0.90	0.30	0.0	0.0	0.0	
	NODE TOTAL			-40.00						0.90	0.30	0.0	0.0	0.0	
61	RANCOCAS	TRIB	-112.90		12.00	12.00	12.00	12.00	12.00						
				-175.00	0.07	0.02	0.07	0.02	0.02	0.85	0.28	0.0	0.0	0.0	
	NODE TOTAL			-175.00						0.85	0.28	0.0	0.0	0.0	
64	BLINGTON	MUN	-1.20		24.00	24.00	24.00	24.00	24.00						
				-1.86	0.10	0.00	0.10	0.00	0.00	0.02	0.00	0.0	0.0	0.0	
	NODE TOTAL			-1.86						0.02	0.00	0.0	0.0	0.0	
65	NSHAMINY	TRIB	-103.23		6.60	6.60	6.60	6.60	6.60						
				-160.00	0.07	0.02	0.07	0.02	0.02	0.43	0.14	0.0	0.0	0.0	
	NODE TOTAL			-160.00						0.43	0.14	0.0	0.0	0.0	
66	BRISTOL	MUN	-2.60		80.00	80.00	80.00	80.00	80.00						
				-4.03	0.10	0.00	0.10	0.00	0.00	0.17	0.00	0.0	0.0	0.0	
	NODE TOTAL			-4.03						0.17	0.00	0.0	0.0	0.0	
69	LW BUCKS	MUN	-7.90		2.90	2.90	2.90	2.90	2.90						
				-12.24	0.10	0.00	0.10	0.00	0.00	0.02	0.00	0.0	0.0	0.0	
	NODE TOTAL			-12.24						0.02	0.00	0.0	0.0	0.0	
73	HAMILTON	MUN	-9.00		17.00	17.00	17.00	17.00	17.00						
				-13.95	0.10	0.00	0.10	0.00	0.00	0.13	0.00	0.0	0.0	0.0	
	NODE TOTAL			-13.95						0.13	0.00	0.0	0.0	0.0	
75	TRENTON	MUN	-19.00		8.00	8.00	8.00	8.00	8.00						
				-29.45	9.95	0.05	9.97	0.03	0.04	12.62	0.06	0.0	0.0	0.0	
	NODE TOTAL			-29.45						12.62	0.06	0.0	0.0	0.0	

76	ASUNPINF	TRIB	-64.52		29.00	29.00	29.00	29.00	29.00						
				-100.00	0.50	0.50	0.50	0.50	0.50	7.81	7.81	0.0	0.0	0.0	
	NODE TOTAL			-100.00						7.81	7.81	0.0	0.0	0.0	

SUMMARY OF DISCHARGE LOADS BY ZONE AND TYPE

INPUT ZONE	TYPE OF DISCHARGE	NUMBER OF DISCHARGES	ADJUSTED INPUT LOADS - 1000 LB/DAY					INPUT LOADS - PERCENT OF ZONE BY TYPE				
			CONST1	CONST2	CONST3	CONST4	CONST5	CONST1	CONST2	CONST3	CONST4	CONST5
1	MUN	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	IND	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	TRIB	1	19.41	6.47	0.0	0.0	0.0	100.00	100.00	0.0	0.0	0.0
-	ZONE TOTAL	1	19.41	6.47	0.0	0.0	0.0	0.13	6.78	0.0	0.0	0.0
2	MUN	5	12.97	0.07	0.0	0.0	0.0	56.49	0.76	0.0	0.0	0.0
2	IND	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	TRIB	4	9.99	8.53	0.0	0.0	0.0	43.51	99.24	0.0	0.0	0.0
	ZONE TOTAL	9	22.95	8.60	0.0	0.0	0.0	0.15	9.00	0.0	0.0	0.0
3	MUN	4	********	56.25	0.0	0.0	0.0	99.98	98.42	0.0	0.0	0.0
3	IND	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	TRIB	1	2.71	0.90	0.0	0.0	0.0	0.02	1.58	0.0	0.0	0.0
-	ZONE TOTAL	5	********	57.15	0.0	0.0	0.0	73.93	59.84	0.0	0.0	0.0
4	MUN	2	3473.73	17.46	0.0	0.0	0.0	99.85	94.31	0.0	0.0	0.0
4	IND	2	1.94	0.01	0.0	0.0	0.0	0.06	0.05	0.0	0.0	0.0
4	TRIB	3	3.13	1.04	0.0	0.0	0.0	0.09	5.64	0.0	0.0	0.0
-	ZONE TOTAL	7	3478.80	18.51	0.0	0.0	0.0	22.97	19.38	0.0	0.0	0.0
5	MUN	1	418.24	2.10	0.0	0.0	0.0	98.01	44.01	0.0	0.0	0.0
5	IND	3	0.50	0.00	0.0	0.0	0.0	0.12	0.05	0.0	0.0	0.0
5	TRIB	2	8.01	2.67	0.0	0.0	0.0	1.88	55.93	0.0	0.0	0.0
-	ZONE TOTAL	6	426.75	4.78	0.0	0.0	0.0	2.42	5.00	0.0	0.0	0.0
	GRAND TOTAL	28	15144.08	95.51	0.0	0.0	0.0					

SECTION 2.4 SPECIFY WATER QUALITY BOUNDARY CONDITIONS

SEAWARD BOUNDARY CONDITIONS

NODE 1 : COURTHOUSE PT , MARYLAND

' CINI ' PERIOD = 2400 CYCLES

START CYCLE	DURATION (CYCLES)	CONST1 (MG/L)	CONST2 (MG/L)	CONST3 (MG/L)	CONST4 (MG/L)	CONST5 (MG/L)
1	2400	0.00	0.02			

NODE 2 : LISTON PT , DELAWARE

' CINMAX ' PERIOD = 2400 CYCLES

START CYCLE	DURATION (CYCLES)	CONST1 (MG/L)	CONST2 (MG/L)	CONST3 (MG/L)	CONST4 (MG/L)	CONST5 (MG/L)
1	2400	0.01	0.00			

UPSTREAM BOUNDARY CONDITIONS

NODE 76 RECIEVES VARYING LOADS FROM DELAWARE (RIVR)

DISCHARGE PERIOD = 2400 CYCLES

START CYCLE	DURATION (CYCLES)	FLOW (CFS)	CONST1 (MG/L)	CONST2 (MG/L)	CONST3 (MG/L)	CONST4 (MG/L)	CONST5 (MG/L)
1	2400	-7880.00	0.46	0.15			

SECTION 2.5 PRINT HYDRAULIC INPUTS

JUNCTION HEAD AND HYD. RADIUS AND X-SECTIONAL AREA OF CHANNELS ARE AT MEAN TIDE **

CHANNEL DATA									JUNCTION DATA							
CHAN.	LENGTH	WIDTH	AREA	MANNING	NET FLOW	HYD. RADIUS	JUNC. AT ENDS		JUNC.	INFLOW	HEAD	CHANNELS ENTERING JUNCTION				
1	7000.	2400.	31042.	0.010	1539.43	12.9	1	3	1	0.0	0.10	1	0	0	0	0
2	11000.	850.	24479.	0.010	1539.41	28.8	3	4	2	0.0	-0.07	9	0	0	0	0
3	11000.	650.	18647.	0.010	1539.43	28.7	4	5	3	0.0	0.10	1	2	0	0	0
4	11000.	600.	17093.	0.010	1539.40	28.5	5	6	4	0.0	0.10	2	3	0	0	0
5	11000.	600.	16918.	0.010	1539.41	28.2	6	7	5	0.0	0.10	3	4	0	0	0
6	11000.	600.	13768.	0.010	1539.38	22.9	7	8	6	0.0	0.10	4	5	0	0	0
7	11000.	600.	12384.	0.010	1539.39	20.6	8	9	7	0.0	0.11	5	6	0	0	0
8	15679.	600.	11039.	0.010	1539.39	18.4	9	10	8	0.0	0.11	6	7	0	0	0
9	14994.	12995.	212742.	0.010	-13197.96	16.4	2	11	9	0.0	0.10	7	8	0	0	0
10	14994.	11829.	183011.	0.010	-13198.80	15.5	11	12	10	0.0	0.09	8	12	0	0	0
11	14994.	7700.	119235.	0.010	-16448.20	15.5	12	13	11	0.0	-0.03	9	10	0	0	0
12	11995.	4500.	78133.	0.010	1539.33	17.4	10	13	12	0.0	0.01	10	11	13	0	0
13	19326.	1700.	11956.	0.010	3249.09	7.0	12	14	13	0.0	0.09	11	12	14	18	20
14	7330.	7600.	68899.	0.010	5736.47	9.1	13	14	14	0.0	0.10	13	14	15	19	0
15	8996.	1000.	8622.	0.015	-16.39	8.6	14	15	15	0.0	0.19	15	16	0	0	0
16	8996.	4332.	32726.	0.015	-16.17	7.6	15	16	16	0.0	0.19	16	17	0	0	0
17	8996.	5331.	40389.	0.015	-15.61	7.6	16	17	17	-15.0	0.19	17	0	0	0	0
18	13661.	3800.	53787.	0.010	6690.48	14.2	13	18	18	0.0	0.11	18	21	0	0	0
19	8996.	5600.	23845.	0.010	9001.87	4.3	14	19	19	0.0	0.14	19	22	0	0	0
20	13661.	3400.	70398.	0.010	-27337.84	20.7	13	20	20	0.0	0.14	20	22	24	0	0
21	10662.	6000.	45839.	0.010	6690.38	7.6	18	21	21	0.0	0.21	21	23	0	0	0
22	9663.	4900.	48016.	0.010	9001.70	9.8	19	20	22	0.0	0.21	23	24	25	0	0
23	10996.	7600.	98327.	0.010	6690.25	12.9	21	22	23	0.0	0.24	25	26	0	0	0
24	13994.	3900.	66887.	0.010	-18336.19	17.2	20	22	24	0.0	0.25	26	27	0	0	0
25	13661.	8996.	149854.	0.010	-11646.09	16.7	22	23	25	0.0	0.26	27	28	33	0	0
26	11995.	8274.	146746.	0.010	-11646.25	17.7	23	24	26	0.0	0.27	28	29	32	0	0
27	11995.	6942.	145752.	0.010	-11646.41	21.0	24	25	27	0.0	0.27	29	30	0	0	0
28	9330.	1000.	14333.	0.015	-780.04	14.3	25	26	28	0.0	0.26	30	31	0	0	0
29	9330.	722.	7506.	0.015	-262.06	10.4	26	27	29	-262.0	0.26	31	0	0	0	0
30	9330.	389.	3595.	0.015	-262.07	9.2	27	28	30	-518.0	0.29	32	0	0	0	0
31	9330.	278.	2289.	0.015	-262.05	8.2	28	29	31	0.0	0.29	33	34	0	0	0
32	9330.	389.	2239.	0.015	-517.98	5.8	26	30	32	0.0	0.32	34	35	0	0	0
33	11995.	8163.	148160.	0.016	-10866.51	18.2	25	31	33	0.0	0.35	35	36	0	0	0
34	11995.	7441.	128240.	0.016	-10866.80	17.2	31	32	34	-49.0	0.37	36	37	38	0	0
35	11995.	6997.	114339.	0.016	-10866.88	16.3	32	33	35	0.0	0.38	38	40	0	0	0
36	13328.	5720.	114952.	0.016	-10867.02	20.1	33	34	36	-83.0	0.40	37	39	0	0	0
37	11995.	4054.	90971.	0.020	-11728.44	22.4	34	36	37	0.0	0.43	40	41	0	0	0
38	10662.	3887.	63885.	0.020	910.37	16.4	34	35	38	0.0	0.43	39	41	42	43	0
39	11995.	4332.	85987.	0.020	-11645.45	19.8	36	38	39	0.0	0.44	42	44	45	0	0
40	7330.	2443.	15694.	0.020	910.35	6.4	35	37	40	-60.0	0.41	44	0	0	0	0
41	7330.	2100.	18473.	0.020	910.36	8.6	37	38	41	0.0	0.48	45	46	0	0	0
42	6331.	2600.	29988.	0.020	-24.01	11.5	38	39	42	0.0	0.46	43	47	0	0	0
43	11995.	4942.	92486.	0.020	-10711.02	16.7	38	42	43	-24.0	0.48	46	47	48	0	0
44	8996.	300.	1799.	0.020	-60.01	6.0	39	40	44	0.0	0.50	48	49	52	0	0
45	6331.	1944.	13392.	0.020	36.03	6.9	39	41	45	0.0	0.51	49	50	0	0	0
46	11995.	2388.	28789.	0.020	36.07	12.1	41	43	46	0.0	0.52	50	51	0	0	0
47	11995.	3499.	77940.	0.020	-10710.95	22.3	42	43	47	-2067.0	0.52	51	0	0	0	0

48	14994.	3998.	89676.	0.020	-10650.69	22.4	43	44	48	0.0	0.51	52	53	0	0	0
49	10662.	750.	9224.	0.020	-2067.88	12.3	44	45	49	0.0	0.52	53	54	55	0	0
50	10662.	611.	10216.	0.020	-2067.64	16.7	45	46	50	0.0	0.52	54	0	0	0	0
51	10662.	555.	7346.	0.020	-2067.23	13.2	46	47	51	0.0	0.53	55	56	0	0	0
52	11995.	3887.	86115.	0.020	-8582.41	22.2	44	48	52	0.0	0.54	56	57	59	0	0
53	11995.	2832.	66008.	0.020	-8582.29	23.3	48	49	53	0.0	0.54	57	58	60	0	0
54	8996.	167.	2119.	0.020	0.01	12.7	49	50	54	-32.0	0.53	58	0	0	0	0
55	11995.	2332.	65651.	0.020	-8582.16	28.2	49	51	55	-255.0	0.55	59	60	61	0	0
56	10329.	2888.	76207.	0.020	-8582.17	26.4	51	52	56	0.0	0.56	61	62	63	0	0
57	6331.	1400.	19081.	0.020	-948.65	13.6	52	53	57	-14.0	0.56	62	0	0	0	0
58	8996.	300.	2091.	0.020	-31.97	7.0	53	54	58	0.0	0.59	63	64	0	0	0
59	11995.	3165.	74005.	0.020	-7633.55	23.4	52	55	59	0.0	0.61	64	65	0	0	0
60	7997.	2499.	30571.	0.020	-916.71	12.2	53	55	60	0.0	0.64	65	66	67	0	0
61	9674.	3195.	65797.	0.020	-8295.45	20.6	55	56	61	-175.0	0.64	66	0	0	0	0
62	9007.	300.	3453.	0.020	-13.98	11.5	56	57	62	0.0	0.67	67	68	0	0	0
63	9674.	2474.	52892.	0.035	-8281.66	21.4	56	58	63	0.0	0.69	68	69	0	0	0
64	9674.	2752.	58386.	0.035	-8281.68	21.2	58	59	64	0.0	0.71	69	70	71	0	0
65	9674.	2419.	47327.	0.035	-8282.13	19.6	59	60	65	-160.0	0.71	70	0	0	0	0
66	9007.	600.	8262.	0.035	-174.87	13.8	60	61	66	0.0	0.73	71	72	73	0	0
67	9007.	2863.	49229.	0.035	-8107.45	17.2	60	62	67	0.0	0.73	73	74	0	0	0
68	9007.	2391.	44320.	0.035	-8107.51	18.5	62	63	68	0.0	0.74	72	74	75	0	0
69	9508.	1890.	38949.	0.035	-8107.66	20.6	63	64	69	0.0	0.77	75	76	0	0	0
70	6331.	334.	4628.	0.035	-159.87	13.9	64	65	70	0.0	0.79	76	77	0	0	0
71	9508.	1640.	37847.	0.035	-7948.16	23.1	64	66	71	0.0	0.83	77	78	0	0	0
72	11009.	1307.	31421.	0.035	-6300.30	24.0	66	68	72	0.0	0.88	78	79	80	0	0
73	7839.	862.	14330.	0.040	-1648.29	16.6	66	67	73	-64.0	0.88	79	0	0	0	0
74	7839.	834.	14004.	0.040	-1648.41	16.8	67	68	74	0.0	0.92	80	81	0	0	0
75	9674.	1362.	31621.	0.040	-7948.96	23.2	68	69	75	0.0	0.98	81	82	0	0	0
76	10842.	1334.	32490.	0.040	-7948.75	24.4	69	70	76	-7880.0	1.18	82	0	0	0	0
77	12009.	1418.	29466.	0.040	-7948.03	20.8	70	71								
78	9007.	1362.	22853.	0.040	-7946.87	16.8	71	72								
79	6005.	334.	3833.	0.040	-64.13	11.5	72	73								
80	7506.	1473.	21551.	0.040	-7881.72	14.6	72	74								
81	8000.	1168.	16973.	0.040	-7880.84	14.5	74	75								
82	8000.	862.	9652.	0.040	-7880.27	11.2	75	76								

SECTION 2.6 SPECIFY INITIAL WATER QUALITY CONDITIONS

WATER QUALITY DATA

JUNC.	INFLOW	FIRST CONSTITUENT INITIAL CONC.	FIRST CONSTITUENT INFLOW LOAD.	SECOND CONSTITUENT INITIAL CONC.	SECOND CONSTITUENT INFLOW LOAD.	THIRD CONSTITUENT INITIAL CONC.	THIRD CONSTITUENT INFLOW LOAD	FOURTH CONSTITUENT INITIAL CONC.	FOURTH CONSTITUENT INFLOW LOAD	FIFTH CONSTITUENT INITIAL CONC.	FIFTH CONSTITUENT INFLOW LOAD
1	0.0	0.10	0.0	0.05	0.0						
2	0.0	0.10	0.0	0.05	0.0						
3	0.0	0.10	0.0	0.05	0.0						
4	0.0	0.10	0.0	0.05	0.0						
5	0.0	0.10	0.0	0.05	0.0						
6	0.0	0.10	0.0	0.05	0.0						
7	0.0	0.10	0.0	0.05	0.0						
8	0.0	0.10	0.0	0.05	0.0						
9	0.0	0.10	0.0	0.05	0.0						
10	0.0	0.10	0.0	0.05	0.0						
11	0.0	0.10	0.0	0.05	0.0						
12	0.0	0.10	0.0	0.05	0.0						
13	0.0	0.10	0.0	0.05	0.0						
14	0.0	0.10	0.0	0.05	0.0						
15	0.0	0.10	0.0	0.05	0.0						
16	0.0	0.10	0.0	0.05	0.0						
17	0.0	0.10	0.0	0.05	0.0						
18	0.0	0.10	0.0	0.05	0.0						
19	0.0	0.10	0.0	0.05	0.0						
20	0.0	0.10	0.0	0.05	0.0						
21	-12.2	0.10	0.11	0.05	0.00						
22	0.0	0.10	0.0	0.05	0.0						
23	0.0	0.10	0.0	0.05	0.0						
24	-5.6	0.10	0.38	0.05	0.00						
25	-195.1	0.10	418.24	0.05	2.10						
26	0.0	0.10	0.0	0.05	0.0						
27	0.0	0.10	0.0	0.05	0.0						
28	0.0	0.10	0.0	0.05	0.0						
29	-262.0	0.10	5.50	0.05	1.83						
30	-518.0	0.10	2.51	0.05	0.84						
31	0.0	0.10	0.0	0.05	0.0						
32	0.0	1.00	0.0	0.06	0.0						
33	0.0	1.00	0.0	0.06	0.0						
34	-212.3	1.00	1.94	0.06	0.01						
35	0.0	1.00	0.0	0.06	0.0						
36	-83.0	1.00	1.78	0.06	0.59						
37	0.0	1.00	0.0	0.06	0.0						
38	0.0	1.00	0.0	0.06	0.0						
39	0.0	1.00	0.0	0.06	0.0						
40	-75.0	1.00	169.90	0.06	1.09						
41	0.0	1.00	0.0	0.06	0.0						
42	0.0	1.00	0.0	0.06	0.0						
43	0.0	10.00	0.0	0.50	0.0						

44	-268.1	10.00	3304.56	0.50	16.61
45	0.0	10.00	0.0	0.50	0.0
46	0.0	10.00	0.0	0.50	0.0
47	-2067.0	10.00	0.63	0.50	0.21
48	0.0	10.00	0.0	0.50	0.0
49	-227.7	10.00	6203.00	0.50	31.17
50	0.0	10.00	0.0	0.50	0.0
51	0.0	10.00	0.0	0.50	0.0
52	0.0	10.00	0.0	0.50	0.0
53	0.0	10.00	0.0	0.50	0.0
54	-38.0	10.00	35.10	0.50	1.07
55	-308.4	10.00	4958.08	0.50	24.91
56	0.0	1.00	0.0	0.06	0.0
57	0.0	1.00	0.0	0.00	0.0
58	0.0	1.00	0.0	0.00	0.0
59	-40.0	1.00	0.90	0.00	0.30
60	0.0	1.00	0.0	0.00	0.0
61	-175.0	1.00	0.85	0.00	0.28
62	0.0	1.00	0.0	0.00	0.0
63	0.0	1.00	0.0	0.00	0.0
64	-1.9	1.00	0.02	0.00	0.00
65	-160.0	0.10	0.43	0.02	0.14
66	-4.0	0.10	0.17	0.02	0.00
67	0.0	0.10	0.0	0.02	0.0
68	0.0	0.10	0.0	0.02	0.0
69	-12.2	0.10	0.02	0.02	0.00
70	0.0	0.10	0.0	0.02	0.0
71	0.0	0.10	0.0	0.02	0.0
72	0.0	0.10	0.0	0.02	0.0
73	-13.9	0.10	0.13	0.02	0.00
74	0.0	0.10	0.0	0.02	0.0
75	-29.4	0.10	12.62	0.02	0.06
76	-7980.0	0.10	27.22	0.02	14.28

SECTION 2.8 SET ADVECTIVE AND DISPERSIVE TRANSPORT FACTORS

TRANSPORT FACTORS

CHANNEL NUMBER	VARYING ADVECTION FLOOD TIDE	VARYING ADVECTION EBB TIDE	DIFFUSION FACTORS C4	DIFFUSION FACTORS (A:SQMI/D)
1	1.00	0.0	20.00	1.14
2	1.00	0.0	30.00	4.60
3	1.00	0.0	40.00	7.78
4	1.00	0.0	50.00	10.29
5	1.00	0.0	60.00	12.02
6	1.00	0.0	70.00	13.60
7	1.00	0.0	80.00	14.99
8	1.00	0.0	90.00	16.04
9	0.60	0.0	100.00	10.40
10	0.33	0.0	100.00	10.73
11	0.20	0.0	75.00	11.09
12	1.00	0.33	50.00	1.02
13	0.20	0.0	50.00	2.02
14	0.20	0.0	50.00	1.11
15	0.50	0.0	50.00	5.25
16	0.50	0.0	50.00	1.04
17	0.50	0.0	50.00	0.40
18	0.50	0.0	50.00	4.77
19	0.50	0.0	50.00	0.90
20	0.50	0.10	50.00	8.97
21	0.50	0.0	50.00	2.82
22	0.50	0.0	50.00	0.68
23	0.50	0.0	25.00	0.95
24	0.50	0.25	25.00	4.16
25	0.67	0.33	25.00	2.46
26	0.67	0.33	10.00	1.01
27	0.67	0.33	1.00	0.11
28	0.67	0.33	1.00	0.02
29	0.67	0.33	1.00	0.02
30	0.67	0.33	1.00	0.03
31	0.67	0.33	1.00	0.02
32	0.67	0.33	1.00	0.01
33	0.67	0.33	1.00	0.09
34	0.67	0.33	1.00	0.09
35	0.67	0.33	1.00	0.09
36	0.67	0.33	1.00	0.10
37	0.67	0.33	1.00	0.12
38	0.67	0.33	1.00	0.02
39	0.67	0.33	1.00	0.11
40	0.67	0.33	1.00	0.03
41	0.67	0.33	1.00	0.03
42	0.67	0.33	1.00	0.03
43	0.67	0.33	1.00	0.09
44	0.67	0.33	1.00	0.02

45	0.67	0.33	1.00	0.03
46	0.67	0.33	1.00	0.02
47	0.67	0.33	1.00	0.12
48	0.67	0.33	1.00	0.11
49	0.67	0.33	1.00	0.03
50	0.67	0.33	1.00	0.02
51	0.67	0.33	1.00	0.01
52	0.67	0.33	1.00	0.10
53	0.67	0.33	1.00	0.12
54	0.67	0.33	1.00	0.01
55	0.67	0.33	1.00	0.14
56	0.67	0.33	1.00	0.10
57	0.67	0.33	1.00	0.04
58	0.67	0.33	1.00	0.01
59	0.67	0.33	1.00	0.07
60	0.67	0.33	1.00	0.02
61	0.67	0.33	1.00	0.08
62	0.67	0.33	1.00	0.01
63	0.67	0.33	1.00	0.09
64	0.67	0.33	1.00	0.08
65	0.67	0.33	1.00	0.08
66	0.67	0.33	1.00	0.01
67	0.67	0.33	1.00	0.06
68	0.67	0.33	1.00	0.06
69	0.67	0.33	1.00	0.07
70	0.67	0.33	1.00	0.01
71	0.67	0.33	1.00	0.07
72	0.67	0.33	1.00	0.06
73	0.67	0.33	1.00	0.03
74	0.67	0.33	1.00	0.02
75	0.67	0.33	1.00	0.06
76	0.67	0.33	1.00	0.06
77	0.67	0.33	1.00	0.04
78	0.67	0.33	1.00	0.03
79	0.67	0.33	1.00	0.00
80	0.67	0.33	1.00	0.02
81	0.67	0.33	1.00	0.02
82	0.67	0.33	1.00	0.03

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                    SECTION 3.0  SIMULATE WATER QUALITY CONDITIONS (MAIN QUALITY LOOP)
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HIGH SLACK PREDICTIONS

JUNCTION NUMBER	HEAD (FT)	CONCENTRATION FACTORS 1ST. CONSTIT. (MGL)	2ND. CONSTIT. (MGL)	3RD. CONSTIT. (MGL)	4TH. CONSTIT. (MGL)	5TH. CONSTIT. (MGL)
		CYCLE 800	16 DAYS, 16.00 HOURS			
2	1.5517	1.00	0.70	1.18	0.0	0.0
11	1.7957	-4.00	1.14	1.14	0.0	0.0
		CYCLE 801	16 DAYS, 16.50 HOURS			
12	1.4382	-5.54	1.09	1.09	0.0	0.0
13	1.8378	-4.00	1.41	1.41	0.0	0.0
20	2.0913	-1.01	1.27	1.28	0.0	0.0
		CYCLE 802	16 DAYS, 17.00 HOURS			
22	1.8274	-4.00	1.65	1.65	0.0	0.0
23	2.0443	1.30	1.82	1.93	0.0	0.0
24	2.2249	-1.17	1.96	1.96	0.0	0.0
25	2.3967	2.47	2.08	2.62	0.0	0.0
- 31	2.5461	2.39	2.19	2.60	0.0	0.0
		CYCLE 803	16 DAYS, 17.50 HOURS			
32	2.1348	2.37	2.27	2.63	0.0	0.0
33	2.3252	2.18	2.36	2.58	0.0	0.0
34	2.5230	1.80	2.45	2.54	0.0	0.0
36	2.6784	1.36	2.51	2.54	0.0	0.0
- 38	2.8251	-4.00	2.59	2.59	0.0	0.0
		CYCLE 804	16 DAYS, 18.00 HOURS			
42	2.4187	2.18	2.65	2.78	0.0	0.0
43	2.6028	-4.00	2.73	2.73	0.0	0.0
44	2.8276	3.70	2.83	3.75	0.0	0.0
48	2.9832	3.00	2.84	3.23	0.0	0.0
- 49	3.1638	4.12	2.91	4.15	0.0	0.0
		CYCLE 805	16 DAYS, 18.50 HOURS			

51	2.8526	4.04	2.89	4.07	0.0	0.0
52	3.0049	3.79	2.82	3.84	0.0	0.0
55	3.1371	4.17	2.77	4.19	0.0	0.0
56	3.2768	4.03	2.67	4.04	0.0	0.0
58	3.4354	3.88	2.48	3.90	0.0	0.0
59	3.5633	3.53	2.26	3.55	0.0	0.0
60	3.6945	3.06	2.16	3.11	0.0	0.0
		CYCLE 806	16 DAYS, 19.00 HOURS			
62	3.4914	2.41	2.15	2.60	0.0	0.0
63	3.6530	1.71	2.18	2.31	0.0	0.0
64	3.8332	0.77	2.23	2.25	0.0	0.0
66	3.9953	0.23	2.27	2.28	0.0	0.0
68	4.1414	-0.11	2.32	2.32	0.0	0.0
69	4.2815	0.02	2.35	2.36	0.0	0.0
70	4.4083	0.54	2.39	2.40	0.0	0.0
71	4.5221	1.23	2.43	2.46	0.0	0.0
72	4.5951	1.83	2.47	2.56	0.0	0.0
		CYCLE 807	16 DAYS, 19.50 HOURS			
74	4.3412	2.34	2.50	2.73	0.0	0.0
75	4.4045	2.75	2.52	2.95	0.0	0.0
76	4.5145	2.65	2.53	2.89	0.0	0.0

STARTS AT CYCLE 800 (16 DAYS 16.0 HOURS) WATER QUALITY SUMMARY ENDS AT CYCLE 850 (17 DAYS 17.0 HOURS)

JUNC	CONSTITUENT 1			CONSTITUENT 2			CONSTITUENT 3			CONSTITUENT 4			CONSTITUENT 5		
	MIN	MAX	AVE	MIN	MAX	AVE	MIN	MAX	AVE	MIN	MAX	AVE	MIN	MAX	AVE
1	0.39	0.39	0.39	1.40	1.40	1.40	1.44	1.44	1.44						
2	-6.46	1.00	-0.46	0.70	1.61	1.29	1.13	1.65	1.38						
3	-0.52	0.25	-0.06	0.34	1.15	0.75	0.57	1.18	0.85						
4	-0.76	0.12	-0.28	0.70	1.12	0.95	0.79	1.14	0.99						
5	-0.85	-0.01	-0.43	0.88	1.21	1.07	0.93	1.21	1.09						
6	-0.91	-0.16	-0.55	1.00	1.27	1.14	1.03	1.28	1.16						
7	-0.95	-0.34	-0.64	1.08	1.33	1.21	1.09	1.33	1.21						
8	-0.96	-0.48	-0.70	1.13	1.37	1.26	1.14	1.38	1.26						
9	-0.77	-0.40	-0.61	1.19	1.41	1.31	1.19	1.42	1.32						
10	-0.63	0.25	-0.20	1.32	1.47	1.39	1.34	1.47	1.41						
11	-6.46	0.64	-1.96	1.13	1.62	1.37	1.13	1.67	1.38						
12	-5.57	1.23	-1.46	1.09	1.76	1.48	1.09	1.87	1.50						
13	-4.00	1.69	-0.66	1.41	1.89	1.65	1.41	2.10	1.71						
14	-3.24	1.06	0.08	1.52	1.75	1.63	1.54	1.79	1.66						
15	-0.34	0.95	0.33	1.47	1.77	1.60	1.48	1.81	1.63						
16	-0.45	0.40	-0.01	1.45	1.56	1.50	1.46	1.59	1.52						
17	-1.04	-0.53	-0.79	1.35	1.40	1.37	1.35	1.40	1.38						
18	-0.11	1.57	0.73	1.61	1.88	1.73	1.62	2.05	1.80						
19	-4.00	1.16	-0.05	1.49	1.66	1.56	1.49	1.78	1.59						
20	-4.00	2.07	0.00	1.27	2.05	1.70	1.27	2.36	1.81						
21	-4.00	1.93	0.58	1.65	1.99	1.79	1.66	2.26	1.88						
22	-4.00	2.27	0.40	1.65	2.15	1.91	1.65	2.51	2.08						
23	1.21	2.44	1.94	1.82	2.25	2.04	1.93	2.64	2.32						
24	-4.00	2.57	1.25	1.96	2.33	2.15	1.96	2.73	2.42						
25	2.39	2.70	2.57	2.08	2.41	2.25	2.58	2.86	2.74						
26	0.93	2.47	1.80	2.40	2.66	2.53	2.59	2.76	2.67						
27	1.47	2.03	1.71	2.55	2.74	2.64	2.65	2.77	2.70						
28	1.10	2.10	1.66	2.71	2.86	2.78	2.72	2.93	2.82						
29	2.52	2.69	2.59	2.91	2.96	2.94	3.06	3.15	3.10						
30	2.62	2.82	2.70	2.36	2.46	2.43	2.85	2.95	2.89						
31	0.77	2.55	1.82	2.19	2.49	2.33	2.35	2.75	2.54						
32	1.57	2.44	2.02	2.27	2.58	2.42	2.54	2.69	2.60						
33	0.64	2.35	1.77	2.36	2.65	2.50	2.51	2.83	2.61						
34	1.09	2.90	1.97	2.45	2.74	2.60	2.54	3.13	2.73						
35	1.72	2.40	2.08	2.62	2.67	2.65	2.69	2.86	2.76						
36	-4.00	3.32	1.90	2.51	2.81	2.67	2.54	3.44	2.90						
37	-4.00	3.18	1.47	2.59	2.77	2.66	2.60	3.32	2.84						
38	-4.00	3.52	1.55	2.59	2.83	2.72	2.59	3.60	3.07						
39	2.01	3.25	2.92	2.71	2.80	2.77	2.79	3.38	3.18						
40	4.19	4.44	4.29	2.98	3.08	3.02	4.22	4.46	4.31						
41	2.38	3.37	2.94	2.74	2.78	2.76	2.90	3.47	3.18						
42	2.11	3.71	3.07	2.65	2.86	2.77	2.77	3.77	3.31						
43	-4.00	3.84	1.87	2.73	2.86	2.81	2.73	3.88	3.42						
44	3.68	4.05	3.88	2.83	2.88	2.86	3.74	4.08	3.93						
45	-4.00	3.54	1.69	-1.13	2.53	1.56	-0.76	3.58	2.26						
46	-1.32	2.54	1.06	-0.24	1.54	0.73	-0.09	2.58	1.32						
47	0.64	1.42	1.20	1.28	1.37	1.32	1.37	1.70	1.58						
48	2.97	4.04	3.72	2.84	2.90	2.87	3.21	4.07	3.79						

49	4.11	4.29	4.22	2.78	2.93	2.87	4.14	4.31	4.24
50	-4.00	3.55	1.75	2.55	2.64	2.60	2.55	3.60	3.16
51	3.45	4.12	3.76	2.60	2.89	2.76	3.51	4.14	3.81
52	3.66	4.09	3.90	2.54	2.82	2.69	3.70	4.10	3.93
53	2.26	4.04	3.50	2.58	2.71	2.65	2.82	4.06	3.61
54	3.69	3.81	3.74	2.98	3.12	3.04	3.78	3.88	3.82
55	4.03	4.25	4.14	2.37	2.78	2.60	4.04	4.26	4.15
56	1.45	4.07	3.16	1.93	2.67	2.31	2.05	4.09	3.29
57	1.63	3.06	2.33	-0.01	1.69	1.13	1.70	3.08	2.36
58	2.37	3.89	3.24	2.13	2.48	2.25	2.58	3.91	3.31
59	-4.00	3.53	1.63	2.12	2.26	2.16	2.12	3.55	2.71
60	-4.00	3.06	0.85	2.13	2.21	2.17	2.15	3.11	2.44
61	1.07	1.69	1.38	2.18	2.19	2.19	2.22	2.31	2.25
62	-4.00	2.45	0.20	2.15	2.25	2.20	2.18	2.63	2.30
63	-1.25	1.73	0.13	2.18	2.28	2.24	2.21	2.32	2.26
64	-0.53	0.77	0.08	2.23	2.31	2.27	2.24	2.31	2.28
65	1.58	1.68	1.62	2.10	2.15	2.13	2.24	2.25	2.25
66	0.09	0.30	0.19	2.27	2.35	2.31	2.28	2.35	2.32
67	-0.55	-0.08	-0.28	2.30	2.34	2.32	2.30	2.34	2.32
68	-0.18	0.50	0.13	2.32	2.38	2.35	2.32	2.38	2.35
69	0.02	0.95	0.54	2.35	2.41	2.38	2.36	2.42	2.39
70	0.54	1.34	1.00	2.39	2.43	2.41	2.40	2.46	2.43
71	1.23	1.82	1.56	2.43	2.47	2.45	2.46	2.55	2.51
72	1.83	2.27	2.08	2.47	2.49	2.48	2.56	2.70	2.63
73	1.24	1.66	1.48	1.87	2.14	2.02	1.96	2.26	2.13
74	2.32	2.56	2.46	2.50	2.51	2.51	2.72	2.84	2.79
75	2.75	2.80	2.77	2.51	2.52	2.52	2.95	2.98	2.97
76	2.64	2.68	2.66	2.52	2.53	2.52	2.88	2.91	2.90

LOW SLACK PREDICTIONS

JUNCTION NUMBER	HEAD (FT)	CONCENTRATION FACTORS 1ST. CONSTIT. (MGL)	2ND. CONSTIT. (MGL)	3RD. CONSTIT. (MGL)	4TH. CONSTIT. (MGL)	5TH. CONSTIT. (MGL)
		CYCLE 1064	22 DAYS, 4.00 HOURS			
2	-0.9948	0.56	1.65	1.68	0.0	0.0
- 11	-1.2327	0.64	1.66	1.70	0.0	0.0
		CYCLE 1065	22 DAYS, 4.50 HOURS			
12	-0.7069	1.23	1.79	1.90	0.0	0.0
13	-1.1629	1.69	1.91	2.12	0.0	0.0
- 20	-1.5285	2.07	2.07	2.37	0.0	0.0
		CYCLE 1066	22 DAYS, 5.00 HOURS			
22	-1.1872	2.24	2.16	2.50	0.0	0.0
23	-1.4942	2.37	2.26	2.62	0.0	0.0
24	-1.7589	2.39	2.34	2.67	0.0	0.0
- 25	-1.9933	2.54	2.42	2.79	0.0	0.0
		CYCLE 1067	22 DAYS, 5.50 HOURS			
31	-1.3223	0.77	2.50	2.50	0.0	0.0
32	-1.5936	1.83	2.59	2.66	0.0	0.0
33	-1.8733	2.35	2.66	2.83	0.0	0.0
- 34	-2.1044	2.90	2.74	3.13	0.0	0.0
		CYCLE 1068	22 DAYS, 6.00 HOURS			
36	-1.4259	3.32	2.81	3.44	0.0	0.0
38	-1.7305	3.52	2.83	3.60	0.0	0.0
42	-1.9449	3.71	2.86	3.77	0.0	0.0
- 43	-2.1394	3.84	2.86	3.88	0.0	0.0
		CYCLE 1069	22 DAYS, 6.50 HOURS			
44	-1.6462	4.05	2.87	4.08	0.0	0.0
48	-1.8908	4.00	2.85	4.03	0.0	0.0
49	-2.1318	4.24	2.78	4.25	0.0	0.0

51	-2.3012	3.47	2.61	3.52	0.0	0.0
		CYCLE 1070	22 DAYS, 7.00 HOURS			
52	-1.7276	3.98	2.54	3.99	0.0	0.0
55	-1.9346	4.09	2.37	4.10	0.0	0.0
56	-2.1232	1.45	1.93	2.05	0.0	0.0
- 58	-2.2700	2.42	2.17	2.61	0.0	0.0
		CYCLE 1071	22 DAYS, 7.50 HOURS			
59	-1.5720	-0.27	2.14	2.14	0.0	0.0
60	-1.8488	-0.53	2.21	2.21	0.0	0.0
62	-2.0390	-0.46	2.25	2.25	0.0	0.0
63	-2.1636	-0.04	2.28	2.28	0.0	0.0
- 64	-2.2396	0.19	2.31	2.31	0.0	0.0
		CYCLE 1072	22 DAYS, 8.00 HOURS			
66	-1.7516	0.30	2.35	2.35	0.0	0.0
68	-1.9550	0.50	2.38	2.38	0.0	0.0
69	-2.1250	0.95	2.41	2.42	0.0	0.0
70	-2.2396	1.34	2.43	2.46	0.0	0.0
71	-2.2856	1.82	2.47	2.55	0.0	0.0
		CYCLE 1073	22 DAYS, 8.50 HOURS			
72	-1.9365	2.26	2.49	2.69	0.0	0.0
- 74	-2.0499	2.55	2.51	2.83	0.0	0.0
		CYCLE 1074	22 DAYS, 9.00 HOURS			
76	-0.9482	2.67	2.52	2.90	0.0	0.0

STARTS AT CYCLE 1050 (21 DAYS 21.0 HOURS)

WATER QUALITY SUMMARY

ENDS AT CYCLE 1100 (22 DAYS 22.0 HOURS)

JUNC	CONSTITUENT 1			CONSTITUENT 2			CONSTITUENT 3			CONSTITUENT 4			CONSTITUENT 5		
	MIN	MAX	AVE	MIN	MAX	AVE	MIN	MAX	AVE	MIN	MAX	AVE	MIN	MAX	AVE
1	0.39	0.39	0.39	1.40	1.40	1.40	1.44	1.44	1.44						
2	-6.76	1.00	-0.48	0.70	1.65	1.33	1.15	1.68	1.41						
3	-0.52	0.25	-0.06	0.36	1.16	0.77	0.58	1.19	0.86						
4	-0.76	0.12	-0.28	0.71	1.14	0.97	0.80	1.16	1.00						
5	-0.85	-0.01	-0.43	0.90	1.24	1.09	0.94	1.25	1.11						
6	-0.91	-0.16	-0.55	1.02	1.31	1.17	1.05	1.32	1.19						
7	-0.95	-0.34	-0.64	1.10	1.37	1.24	1.12	1.37	1.25						
8	-0.96	-0.46	-0.70	1.16	1.42	1.30	1.17	1.42	1.30						
9	-0.77	-0.40	-0.61	1.22	1.46	1.35	1.23	1.46	1.36						
10	-0.63	0.25	-0.20	1.37	1.51	1.44	1.38	1.52	1.45						
11	-6.76	0.64	-1.97	1.15	1.66	1.41	1.15	1.70	1.42						
12	-5.86	1.23	-1.47	1.20	1.80	1.53	1.20	1.90	1.56						
13	-4.00	1.69	-0.66	1.47	1.91	1.69	1.47	2.12	1.75						
14	-3.56	1.06	0.07	1.59	1.78	1.68	1.60	1.82	1.70						
15	-0.34	0.95	0.33	1.55	1.80	1.65	1.55	1.84	1.68						
16	-0.45	0.40	-0.01	1.53	1.62	1.57	1.53	1.64	1.58						
17	-1.04	-0.53	-0.79	1.44	1.47	1.46	1.44	1.48	1.46						
18	-0.11	1.57	0.73	1.65	1.91	1.76	1.66	2.07	1.83						
19	-4.00	1.16	-0.05	1.55	1.70	1.61	1.55	1.81	1.64						
20	-4.00	2.07	0.00	1.36	2.07	1.74	1.36	2.37	1.85						
21	-4.00	1.93	0.58	1.70	2.01	1.82	1.71	2.27	1.91						
22	-4.00	2.27	0.40	1.70	2.16	1.94	1.70	2.52	2.10						
23	1.21	2.44	1.94	1.86	2.26	2.07	1.96	2.65	2.33						
24	-4.00	2.57	1.25	1.99	2.34	2.17	1.99	2.73	2.43						
25	2.39	2.70	2.57	2.11	2.42	2.26	2.58	2.87	2.75						
26	0.93	2.47	1.80	2.41	2.66	2.53	2.60	2.76	2.67						
27	1.47	2.03	1.71	2.55	2.74	2.64	2.65	2.77	2.70						
28	1.10	2.10	1.66	2.71	2.86	2.78	2.72	2.93	2.82						
29	2.52	2.69	2.59	2.91	2.96	2.94	3.06	3.15	3.10						
30	2.62	2.82	2.70	2.36	2.46	2.43	2.84	2.95	2.89						
31	0.77	2.55	1.82	2.21	2.50	2.35	2.37	2.75	2.55						
32	1.57	2.44	2.02	2.28	2.59	2.43	2.55	2.69	2.61						
33	0.64	2.35	1.77	2.37	2.66	2.51	2.52	2.83	2.62						
34	1.09	2.90	1.97	2.46	2.74	2.60	2.54	3.13	2.74						
35	1.72	2.40	2.06	2.63	2.68	2.65	2.70	2.86	2.76						
36	-4.00	3.32	1.90	2.52	2.81	2.67	2.55	3.44	2.91						
37	-4.00	3.18	1.47	2.60	2.77	2.66	2.61	3.32	2.84						
38	-4.00	3.52	1.55	2.60	2.83	2.73	2.60	3.60	3.08						
39	2.01	3.25	2.92	2.72	2.80	2.78	2.80	3.38	3.18						
40	4.19	4.44	4.29	2.98	3.08	3.02	4.22	4.46	4.31						
41	2.38	3.37	2.94	2.74	2.78	2.76	2.90	3.47	3.19						
42	2.11	3.71	3.07	2.66	2.86	2.77	2.77	3.77	3.31						
43	-4.00	3.84	1.87	2.73	2.87	2.81	2.73	3.88	3.42						
44	3.68	4.05	3.88	2.83	2.88	2.86	3.74	4.08	3.93						
45	-4.00	3.54	1.69	-1.13	2.53	1.56	-0.76	3.58	2.26						
46	-1.32	2.54	1.06	-0.24	1.54	0.73	-0.09	2.58	1.32						
47	0.64	1.42	1.20	1.28	1.37	1.32	1.37	1.70	1.58						
48	2.97	4.04	3.72	2.84	2.90	2.87	3.21	4.07	3.79						

49	4.11	4.29	4.22	2.78	2.93	2.87	4.14	4.31	4.24
50	-4.00	3.55	1.75	2.55	2.64	2.60	2.55	3.60	3.16
51	3.45	4.12	3.76	2.60	2.89	2.76	3.51	4.14	3.81
52	3.66	4.09	3.90	2.54	2.82	2.69	3.70	4.10	3.93
53	2.26	4.04	3.50	2.58	2.71	2.65	2.82	4.06	3.61
54	3.69	3.81	3.74	2.98	3.12	3.04	3.78	3.88	3.82
55	4.03	4.25	4.14	2.37	2.78	2.60	4.04	4.26	4.15
56	1.45	4.07	3.16	1.93	2.67	2.31	2.05	4.09	3.29
57	1.63	3.06	2.33	-0.04	1.69	1.12	1.70	3.08	2.36
58	2.37	3.89	3.24	2.13	2.44	2.25	2.58	3.91	3.31
59	-4.00	3.53	1.63	2.12	2.26	2.16	2.12	3.55	2.71
60	-4.00	3.06	0.85	2.13	2.21	2.17	2.15	3.11	2.44
61	1.07	1.69	1.38	2.18	2.19	2.19	2.22	2.31	2.25
62	-4.00	2.45	0.20	2.15	2.25	2.20	2.18	2.63	2.30
63	-1.25	1.73	0.13	2.18	2.28	2.24	2.21	2.32	2.26
64	-0.53	0.77	0.08	2.23	2.31	2.27	2.24	2.31	2.28
65	1.58	1.68	1.62	2.10	2.15	2.13	2.24	2.25	2.25
66	0.09	0.30	0.19	2.27	2.35	2.31	2.28	2.35	2.32
67	-0.55	-0.08	-0.28	2.30	2.34	2.32	2.30	2.34	2.32
68	-0.18	0.50	0.13	2.32	2.38	2.35	2.32	2.38	2.35
69	0.02	0.95	0.54	2.35	2.41	2.38	2.36	2.42	2.39
70	0.54	1.34	1.00	2.39	2.43	2.41	2.40	2.46	2.43
71	1.23	1.82	1.56	2.43	2.47	2.45	2.46	2.55	2.51
72	1.83	2.27	2.08	2.47	2.49	2.48	2.56	2.70	2.63
73	1.24	1.66	1.48	1.87	2.14	2.02	1.96	2.26	2.13
74	2.32	2.56	2.46	2.50	2.51	2.51	2.72	2.84	2.79
75	2.75	2.80	2.77	2.51	2.52	2.52	2.95	2.98	2.97
76	2.64	2.68	2.66	2.52	2.53	2.52	2.88	2.91	2.90

RESTART DECK TAPE WAS LAST WRITTEN AFTER CYCLE 1200
HYDRAULIC CYCLE ON EXTRACT TAPE FOR RESTARTING = 168
NTAG = 4

THE TOTAL MASS (TONS) FOR EACH CONSTITUENT AT CYCLE 1200 IS AS FOLLOWS

14753929887744.00 2574826602496.00

THE TOTAL MASS (TONS) DEPLETED FOR EACH CONSTITUENT AS OF CYCLE 1200 IS AS FOLLOWS

655791095808.00 32538112.00

********** WATER QUALITY SUMMARY **********

STARTS AT CYCLE 800 (16 DAYS 16.0 HOURS)

ENDS AT CYCLE 1200 (25 DAYS 24.0 HOURS)

JUNC	CONSTITUENT 1			CONSTITUENT 2			CONSTITUENT 3			CONSTITUENT 4			CONSTITUENT 5		
	MIN	MAX	AVE	MIN	MAX	AVE	MIN	MAX	AVE	MIN	MAX	AVE	MIN	MAX	AVE
1	0.39	0.39	0.39	1.40	1.40	1.40	1.44	1.44	1.44						
2	-6.97	1.00	-0.50	0.70	1.66	1.33	1.13	1.69	1.41						
3	-0.52	0.25	-0.06	0.34	1.18	0.76	0.56	1.21	0.86						
4	-0.76	0.12	-0.28	0.69	1.15	0.96	0.78	1.17	1.00						
5	-0.85	-0.01	-0.43	0.88	1.25	1.08	0.93	1.26	1.10						
6	-0.91	-0.16	-0.55	1.00	1.32	1.17	1.03	1.33	1.18						
7	-0.95	-0.34	-0.65	1.08	1.38	1.23	1.09	1.38	1.24						
8	-0.96	-0.48	-0.70	1.13	1.43	1.29	1.14	1.43	1.29						
9	-0.77	-0.40	-0.62	1.19	1.47	1.34	1.19	1.47	1.35						
10	-0.63	0.25	-0.20	1.32	1.52	1.43	1.34	1.53	1.44						
11	-6.97	0.64	-1.93	1.13	1.67	1.40	1.13	1.71	1.41						
12	-6.08	1.23	-1.43	1.09	1.80	1.52	1.09	1.90	1.55						
13	-4.00	1.69	-0.60	1.41	1.92	1.68	1.41	2.12	1.75						
14	-3.82	1.06	0.13	1.52	1.78	1.67	1.54	1.83	1.69						
15	-0.34	0.95	0.32	1.47	1.80	1.63	1.48	1.84	1.66						
16	-0.45	0.40	-0.02	1.45	1.62	1.55	1.46	1.65	1.56						
17	-1.04	-0.53	-0.80	1.35	1.49	1.43	1.35	1.49	1.44						
18	-0.11	1.57	0.74	1.61	1.91	1.76	1.62	2.07	1.82						
19	-4.00	1.16	-0.06	1.49	1.71	1.60	1.49	1.82	1.62						
20	-4.00	2.07	0.02	1.27	2.08	1.74	1.27	2.37	1.85						
21	-4.00	1.93	0.59	1.65	2.02	1.82	1.66	2.28	1.91						
22	-4.00	2.27	0.48	1.65	2.17	1.93	1.65	2.52	2.10						
23	1.21	2.44	1.95	1.82	2.27	2.06	1.93	2.65	2.33						
24	-4.00	2.57	1.30	1.96	2.34	2.17	1.96	2.74	2.43						
25	2.39	2.70	2.57	2.08	2.42	2.26	2.58	2.87	2.75						
26	0.93	2.47	1.79	2.40	2.66	2.53	2.59	2.76	2.67						
27	1.47	2.03	1.70	2.55	2.74	2.64	2.65	2.77	2.70						
28	1.10	2.10	1.66	2.71	2.86	2.78	2.72	2.93	2.82						
29	2.52	2.69	2.59	2.91	2.96	2.94	3.06	3.15	3.10						
30	2.62	2.82	2.70	2.36	2.46	2.43	2.84	2.95	2.89						
31	0.77	2.55	1.81	2.19	2.50	2.34	2.35	2.75	2.55						
32	1.57	2.44	2.01	2.27	2.59	2.43	2.54	2.69	2.61						
33	0.64	2.35	1.76	2.36	2.66	2.51	2.51	2.83	2.61						
34	1.09	2.90	1.97	2.45	2.74	2.60	2.54	3.13	2.74						
35	1.72	2.40	2.08	2.62	2.68	2.65	2.69	2.86	2.76						
36	-4.00	3.32	1.94	2.51	2.81	2.67	2.54	3.44	2.91						
37	-4.00	3.18	1.46	2.59	2.77	2.66	2.60	3.32	2.84						
38	-4.00	3.52	1.65	2.59	2.83	2.73	2.59	3.60	3.08						
39	2.01	3.25	2.92	2.71	2.80	2.77	2.79	3.38	3.19						
40	4.19	4.44	4.29	2.98	3.08	3.02	4.22	4.46	4.31						
41	2.38	3.37	2.94	2.74	2.78	2.76	2.90	3.47	3.19						
42	2.11	3.71	3.08	2.65	2.86	2.77	2.77	3.77	3.31						
43	-4.00	3.84	1.97	2.73	2.87	2.81	2.73	3.88	3.43						
44	3.68	4.05	3.89	2.83	2.88	2.86	3.74	4.08	3.93						
45	-4.00	3.54	1.66	-1.13	2.53	1.54	-0.76	3.58	2.24						
46	-1.32	2.54	1.03	-0.24	1.54	0.72	-0.09	2.58	1.30						
47	0.64	1.42	1.20	1.28	1.37	1.32	1.37	1.70	1.58						
48	2.97	4.04	3.72	2.84	2.90	2.87	3.21	4.07	3.79						

49	4.11	4.29	4.22	2.78	2.93	2.87	4.14	4.31	4.24
50	-4.00	3.55	1.72	2.55	2.64	2.60	2.55	3.60	3.15
51	3.45	4.12	3.75	2.60	2.89	2.76	3.51	4.14	3.80
52	3.66	4.09	3.90	2.54	2.82	2.69	3.70	4.11	3.93
53	2.26	4.04	3.51	2.58	2.71	2.66	2.82	4.06	3.62
54	3.69	3.81	3.74	2.98	3.12	3.04	3.78	3.86	3.82
55	4.03	4.25	4.14	2.37	2.78	2.60	4.04	4.26	4.15
56	1.45	4.07	3.15	1.93	2.67	2.31	2.05	4.09	3.27
57	1.63	3.06	2.33	-0.04	1.69	1.12	1.70	3.08	2.35
58	2.37	3.89	3.24	2.13	2.48	2.25	2.58	3.91	3.30
59	-4.00	3.53	1.61	2.12	2.26	2.16	2.12	3.55	2.70
60	-4.00	3.06	0.83	2.13	2.21	2.17	2.15	3.11	2.44
61	1.07	1.69	1.38	2.18	2.19	2.19	2.22	2.31	2.25
62	-4.00	2.45	0.20	2.15	2.25	2.20	2.18	2.63	2.30
63	-1.25	1.73	0.13	2.18	2.28	2.24	2.21	2.32	2.26
64	-0.53	0.77	0.08	2.23	2.31	2.27	2.24	2.31	2.28
65	1.58	1.68	1.62	2.10	2.15	2.13	2.24	2.25	2.25
66	0.09	0.30	0.19	2.27	2.35	2.31	2.28	2.35	2.32
67	-0.55	-0.08	-0.28	2.30	2.34	2.32	2.30	2.34	2.32
68	-0.18	0.50	0.13	2.32	2.38	2.35	2.32	2.38	2.35
69	0.02	0.95	0.54	2.35	2.41	2.38	2.36	2.42	2.39
70	0.54	1.34	1.00	2.39	2.43	2.41	2.40	2.46	2.43
71	1.23	1.82	1.56	2.43	2.47	2.45	2.46	2.55	2.51
72	1.83	2.27	2.08	2.47	2.49	2.48	2.56	2.70	2.63
73	1.24	1.66	1.47	1.87	2.14	2.02	1.96	2.26	2.13
74	2.32	2.56	2.46	2.50	2.51	2.51	2.72	2.84	2.79
75	2.75	2.80	2.77	2.51	2.52	2.52	2.95	2.98	2.96
76	2.64	2.68	2.66	2.52	2.53	2.52	2.88	2.91	2.90

RESTART DECK TAPE WAS LAST WRITTEN AFTER CYCLE 1201
HYDRAULIC CYCLE ON EXTRACT TAPE FOR RESTARTING = 174
NIAG = 5

THE TOTAL MASS (TONS) FOR EACH CONSTITUENT AT CYCLE 1201 IS AS FOLLOWS

14752800571392.00 2574950334464.00

THE TOTAL MASS (TONS) DEPLETED FOR EACH CONSTITUENT AS OF CYCLE 1201 IS AS FOLLOWS

655791095808.00 32538112.00

END OF QUALITY RUN. 1201 CYCLES.

THE FOLLOWING DEPLETION CORRECTIONS (MG/L * CU FT) WERE ACCUMULATED FOR CONSTITUENT 1

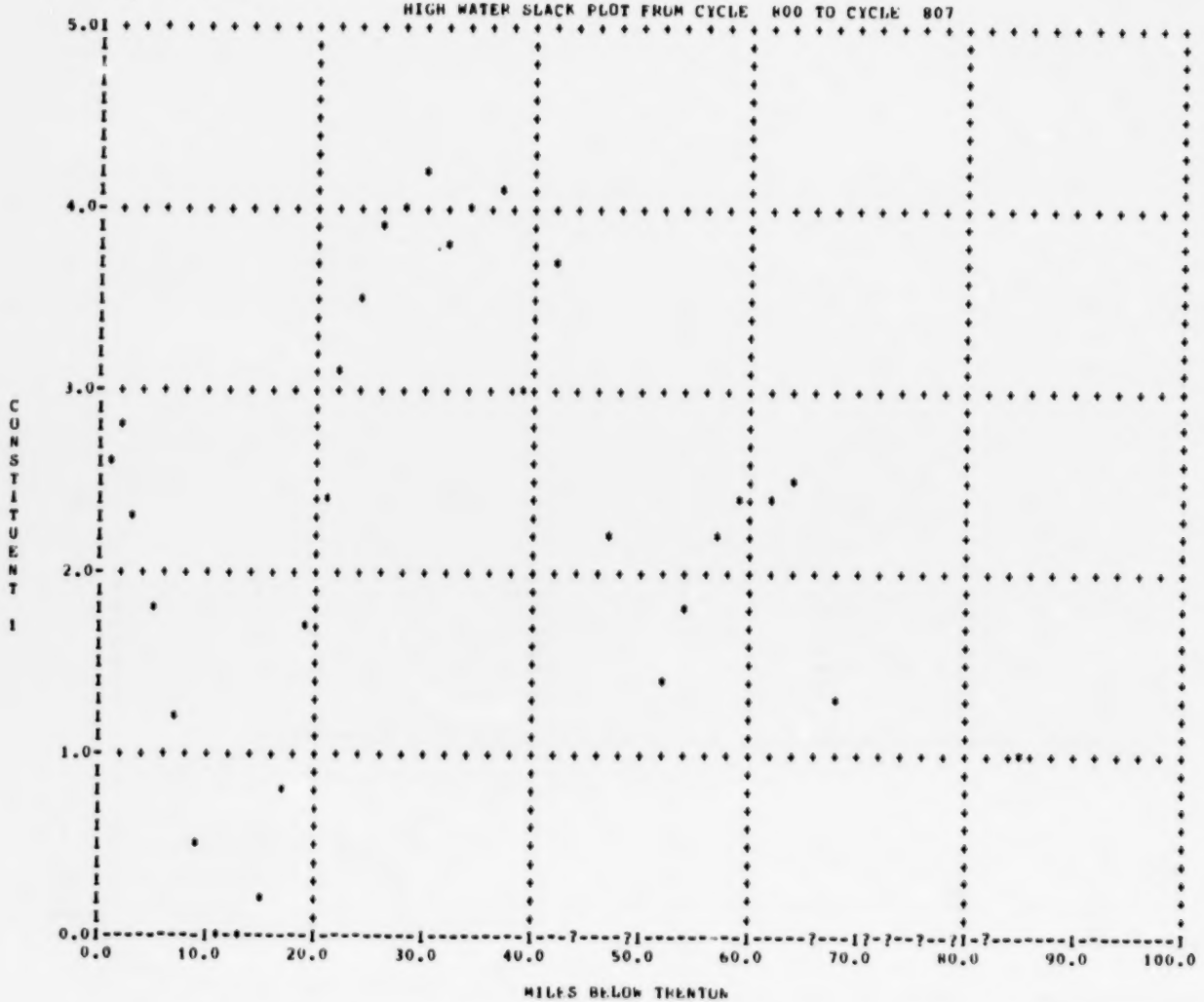
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4171708.	22447344.	21377488.	0.	0.	0.	0.	0.	168408.	40083808.
13805423.	14658709.	0.	238040672.	0.	0.	0.	0.	0.	0.
431315.	0.	0.	0.	0.	170890512.	62591088.	350875136.	0.	0.
4446268.	58224848.	1495919104.	0.	22247296.	0.	0.	0.	0.	16899072.
0.	0.	770819.	0.	0.	0.	0.	0.	268381440.	12135956.
0.	450316.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.				

THE FOLLOWING DEPLETION CORRECTIONS (MG/L * CU FT) WERE ACCUMULATED FOR CONSTITUENT 2

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	136327.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	2051.	0.	0.	0.
0.	0.	0.	1492.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.				

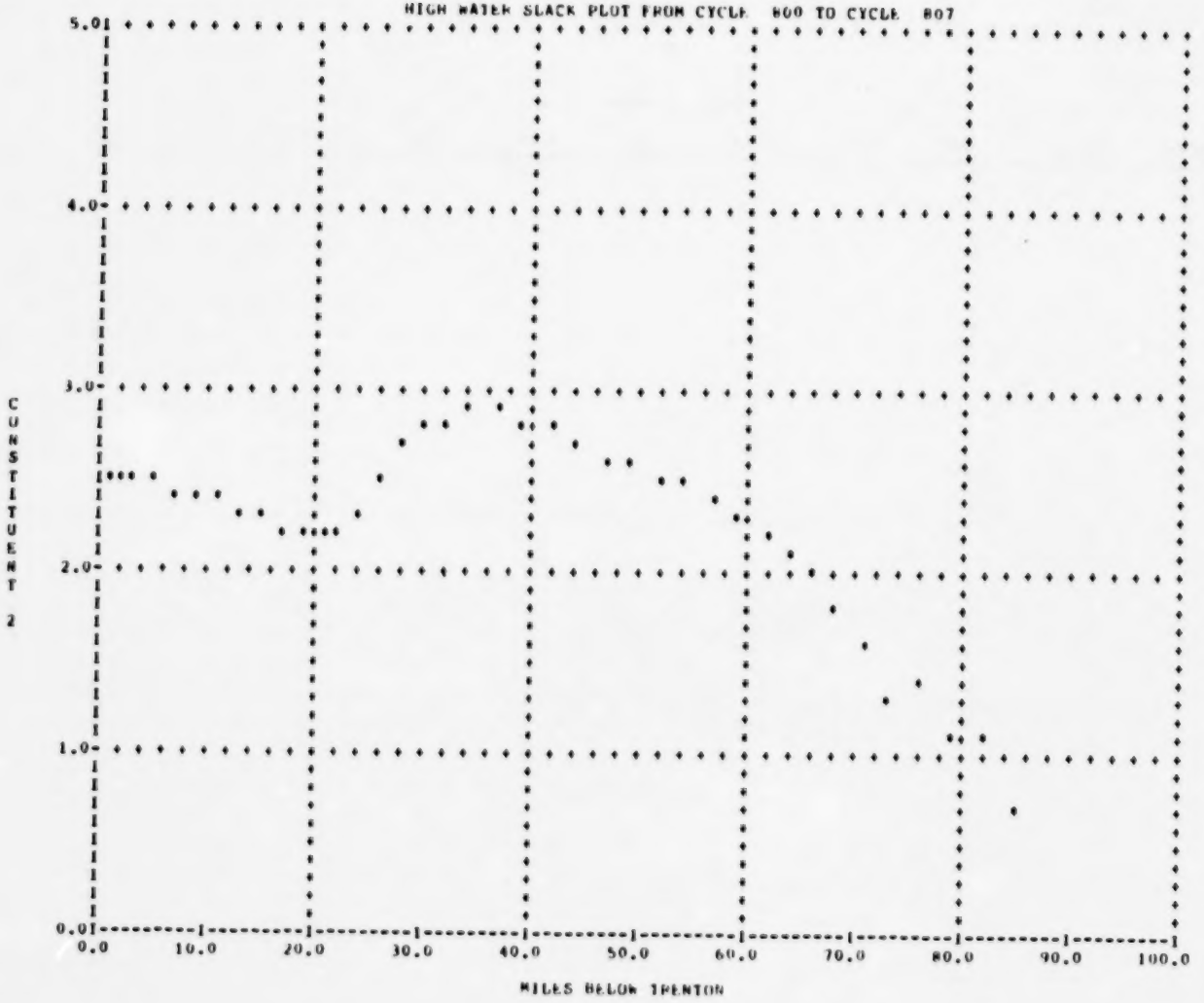
DELAWARE ESTUARY CENTER CHANNEL

HIGH WATER SLACK PLOT FROM CYCLE 800 TO CYCLE 807



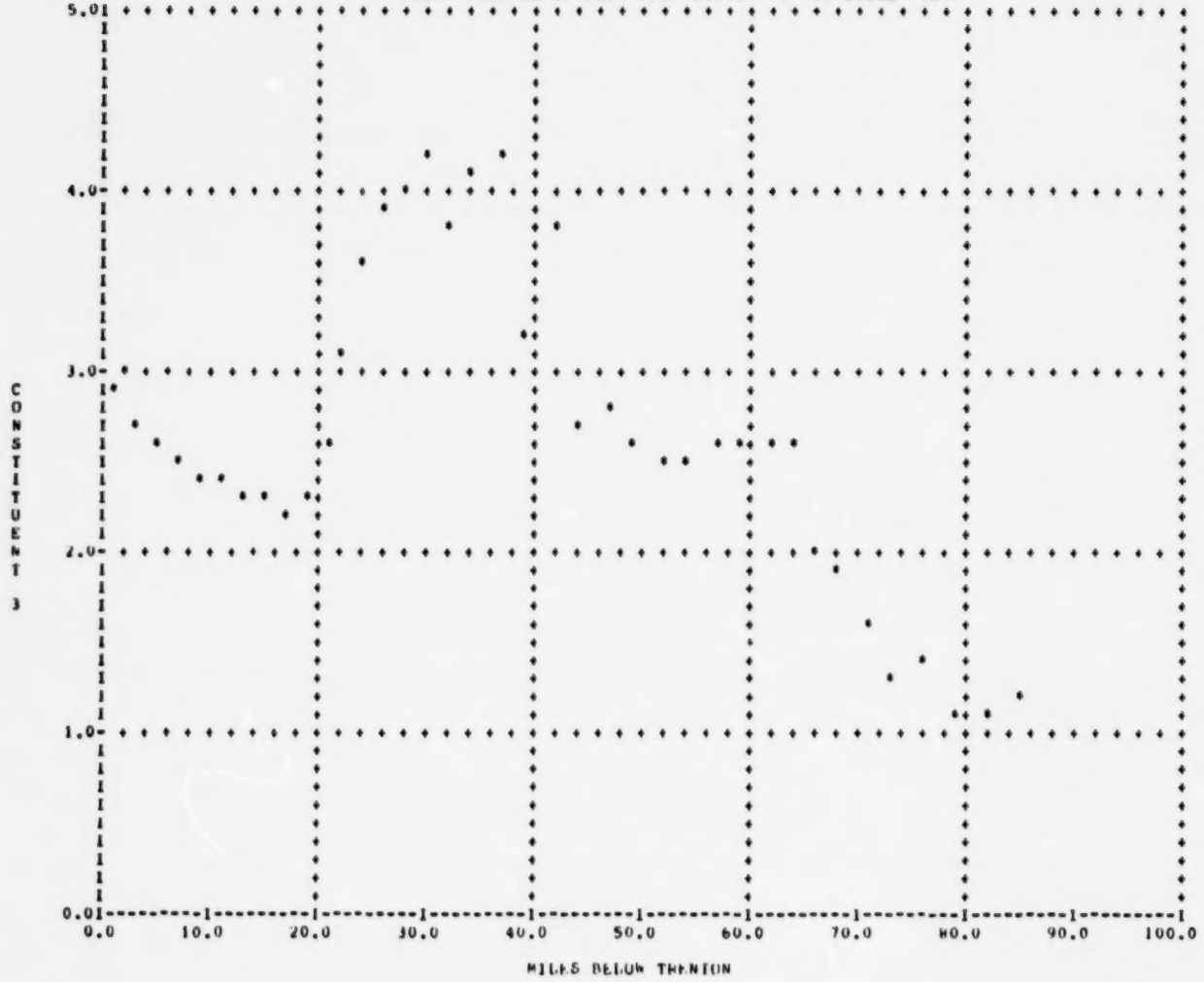
DELAWARE ESTUARY CENTER CHANNEL

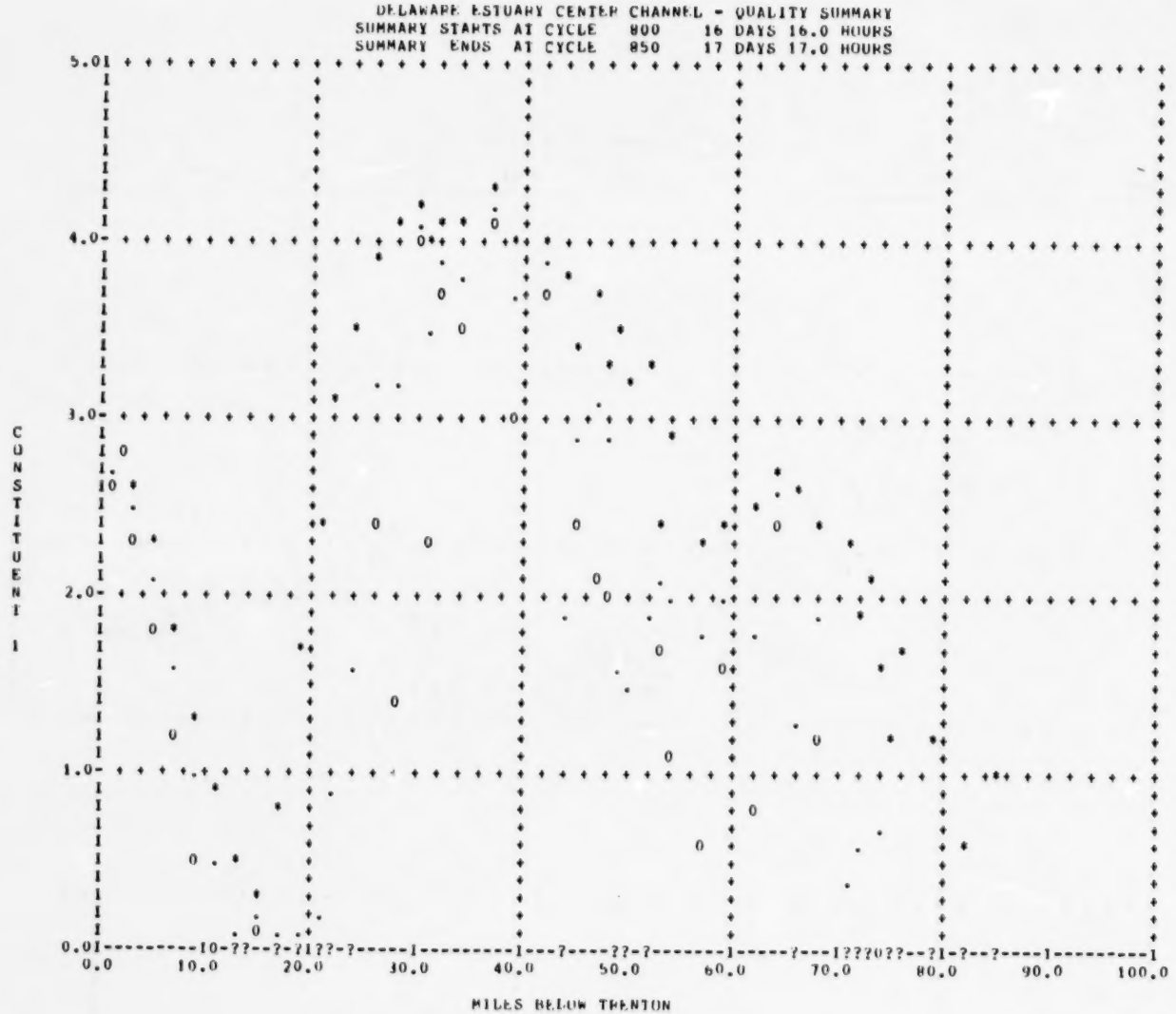
HIGH WATER SLACK PLOT FROM CYCLE 800 TO CYCLE 807

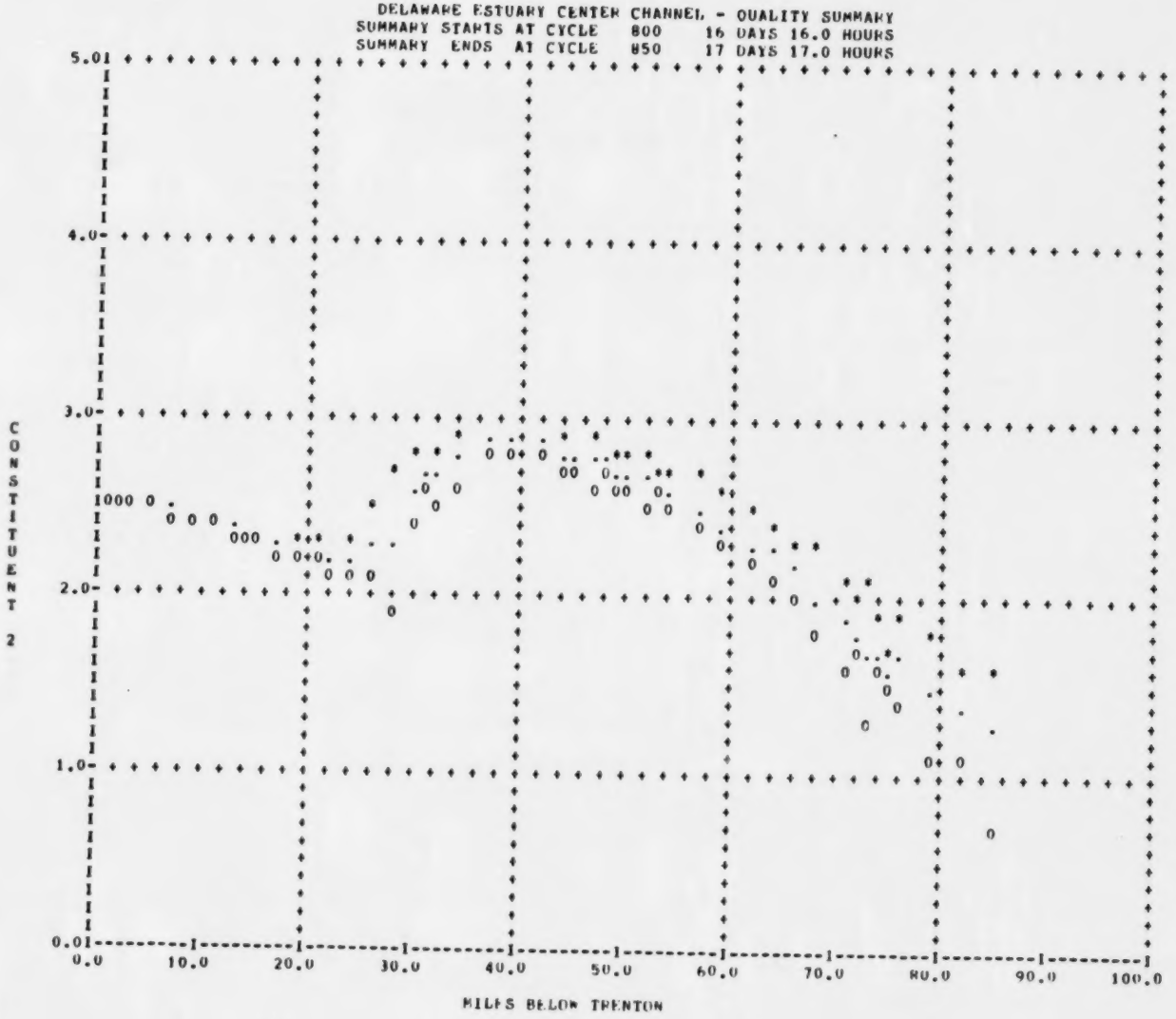


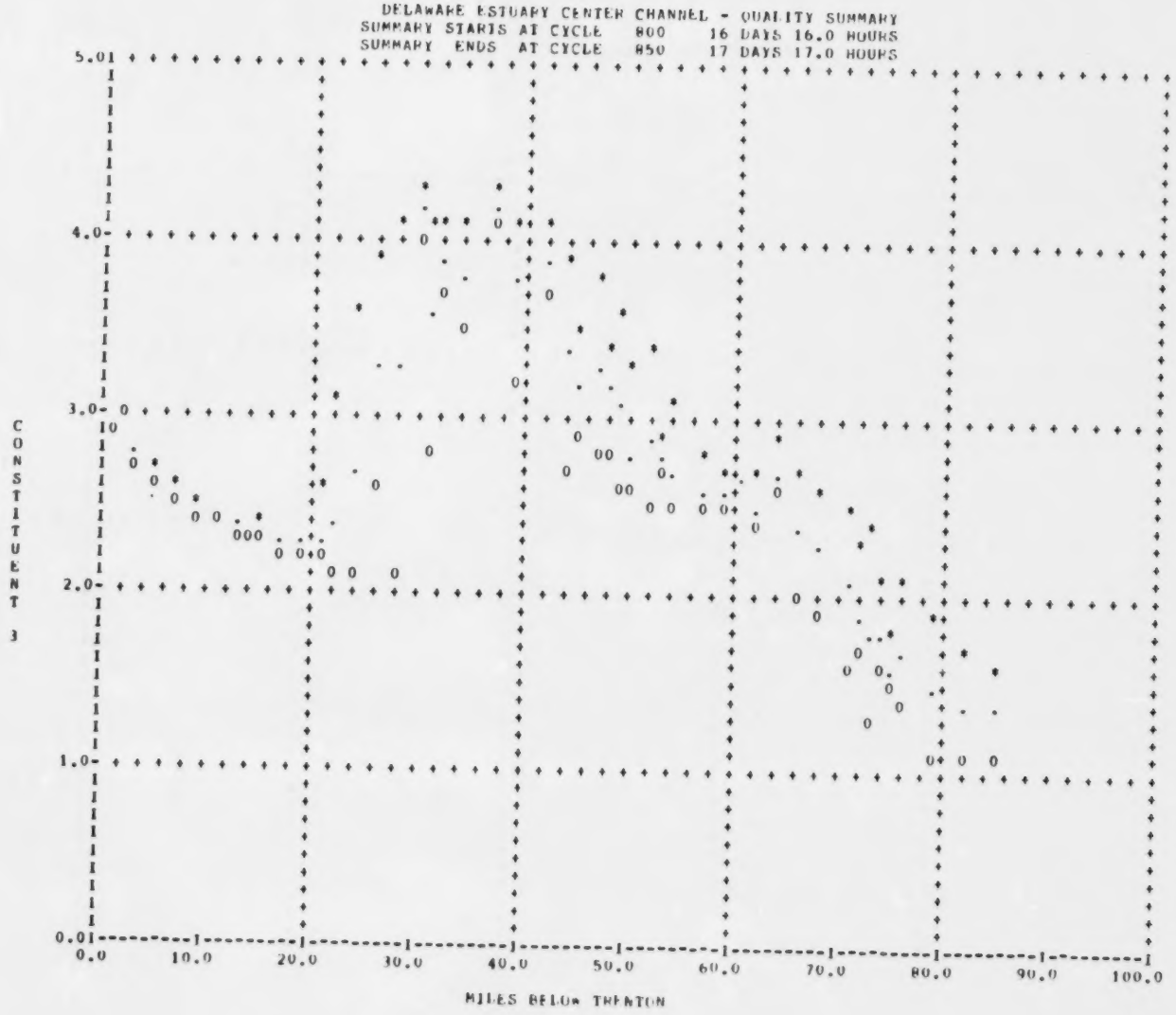
DELAWARE ESTUARY CENTER CHANNEL

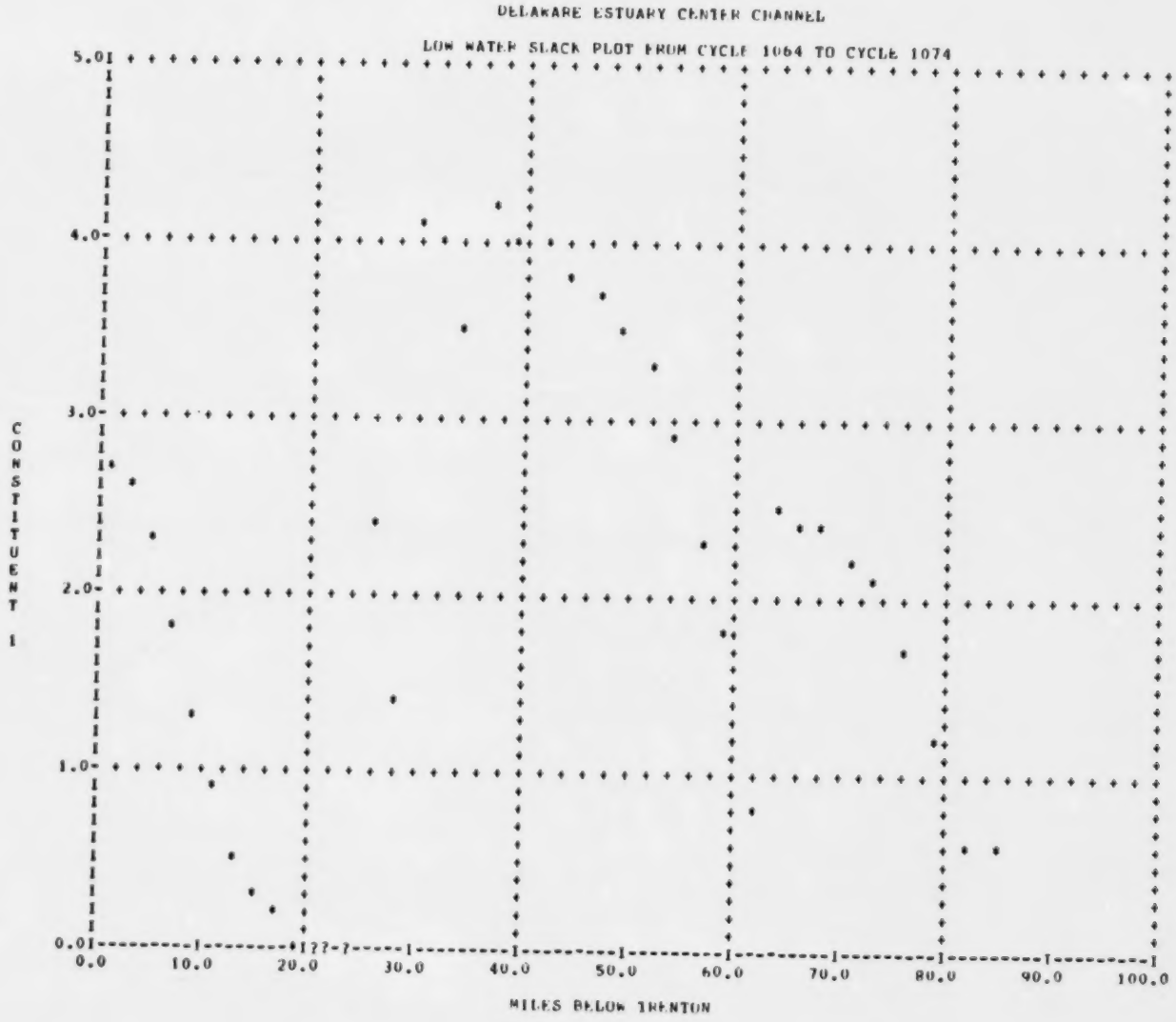
HIGH WATER SLACK PLOT FROM CYCLE 800 TO CYCLE 807




DELAWARE ESTUARY CENTER CHANNEL - QUALITY SUMMARY
SUMMARY STARTS AT CYCLE 800 16 DAYS 16.0 HOURS
SUMMARY ENDS AT CYCLE 850 17 DAYS 17.0 HOURS
CONSTITUENT 1
5.0
4.0
3.0
2.0
1.0
0.0
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
MILES BELOW TRENTON

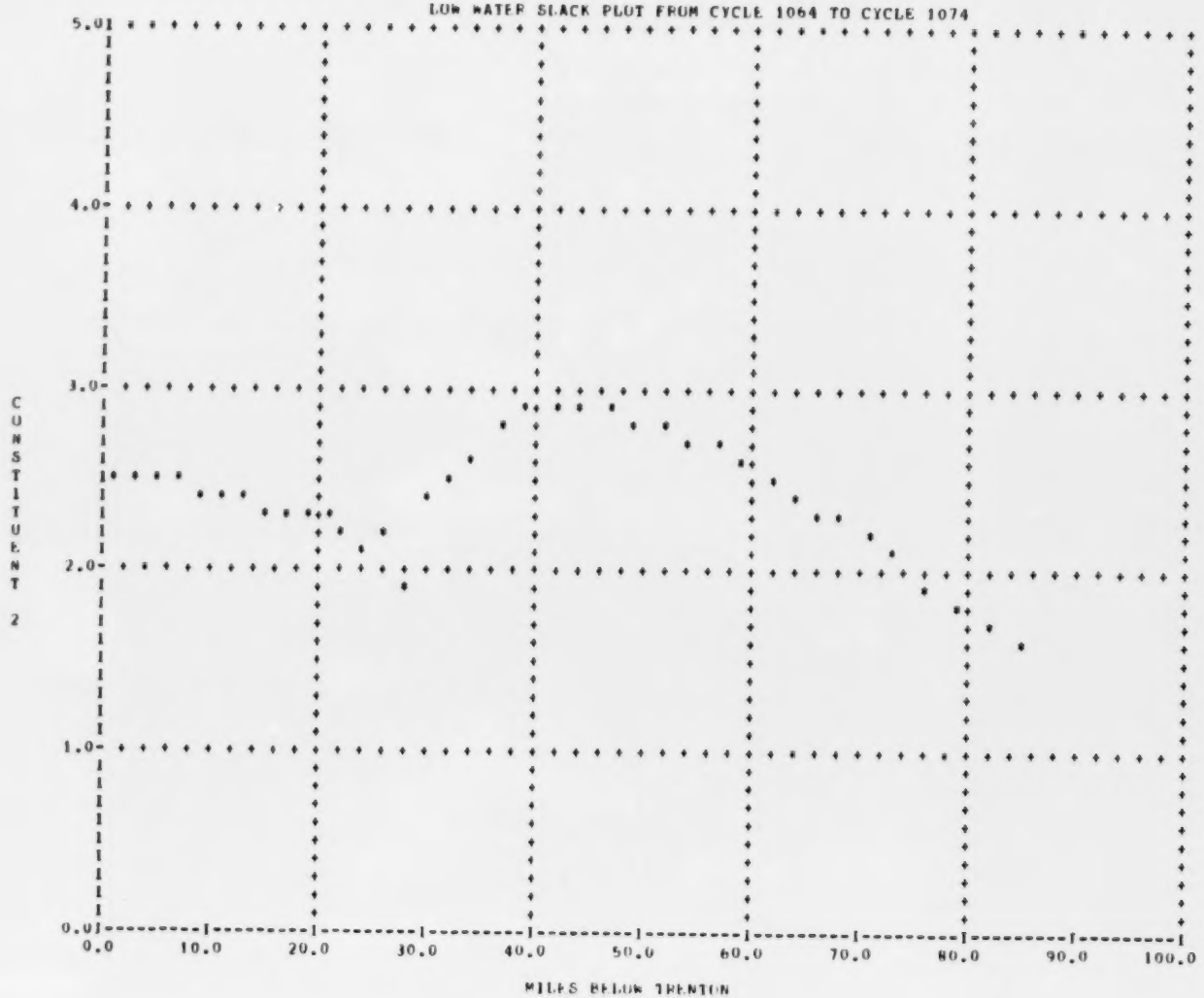

DELAWARE ESTUARY CENTER CHANNEL - QUALITY SUMMARY
SUMMARY STARTS AT CYCLE 800 16 DAYS 16.0 HOURS
SUMMARY ENDS AT CYCLE 850 17 DAYS 17.0 HOURS
CONSTITUENT 2
5.0
4.0
3.0
2.0
1.0
0.0
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
MILES BELOW TRENTON


DELAWARE ESTUARY CENTER CHANNEL - QUALITY SUMMARY
SUMMARY STARTS AT CYCLE 800 16 DAYS 16.0 HOURS
SUMMARY ENDS AT CYCLE 850 17 DAYS 17.0 HOURS
CONSTITUENT 3
5.0
4.0
3.0
2.0
1.0
0.0
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
MILES BELOW TRENTON


DELAWARE ESTUARY CENTER CHANNEL
LOW WATER SLACK PLOT FROM CYCLE 1064 TO CYCLE 1074
CONSTITUENT 1
5.0
4.0
3.0
2.0
1.0
0.0
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
MILES BELOW TRENTON

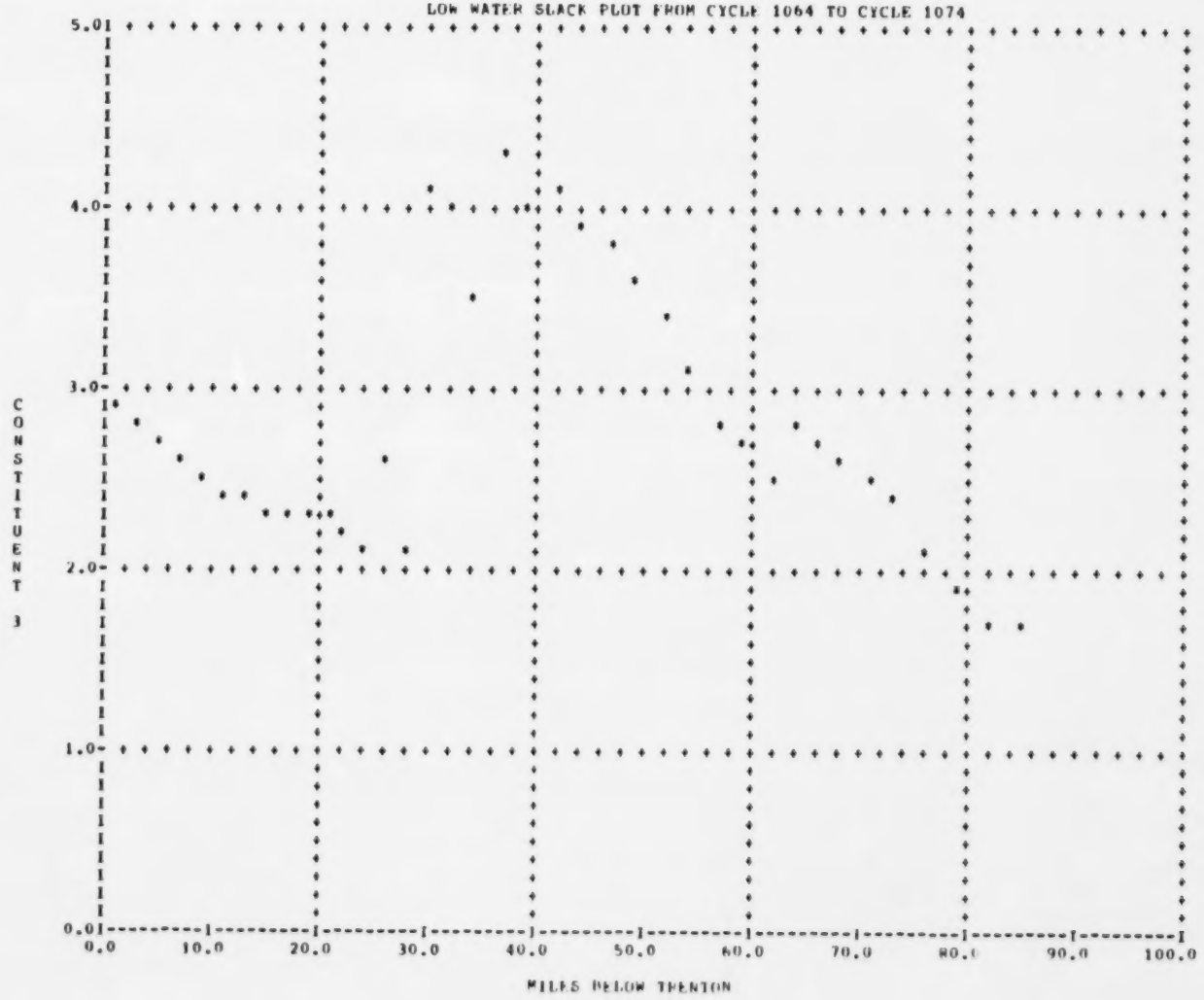
DELAWARE ESTUARY CENTER CHANNEL

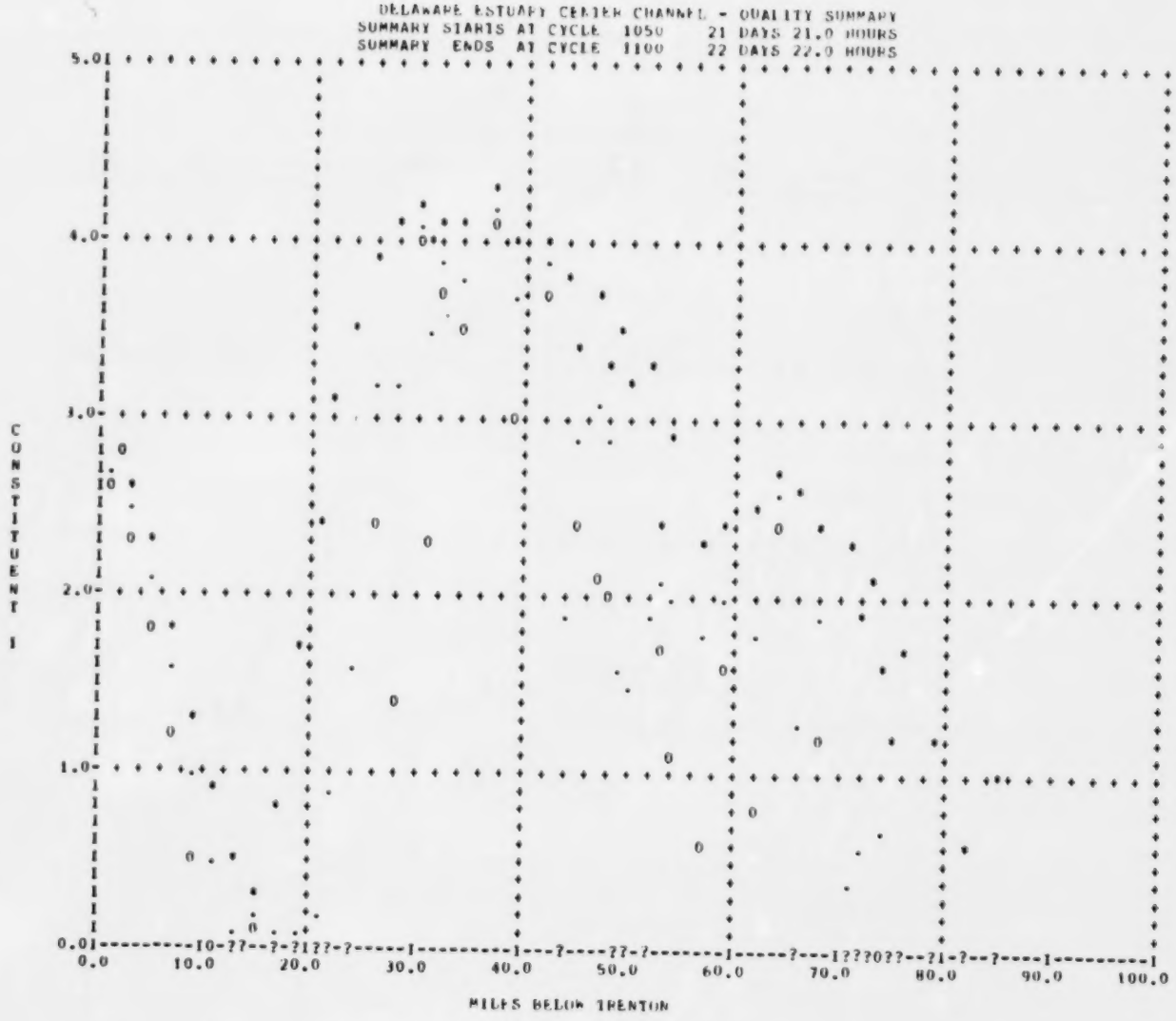
LOW WATER SLACK PLOT FROM CYCLE 1064 TO CYCLE 1074

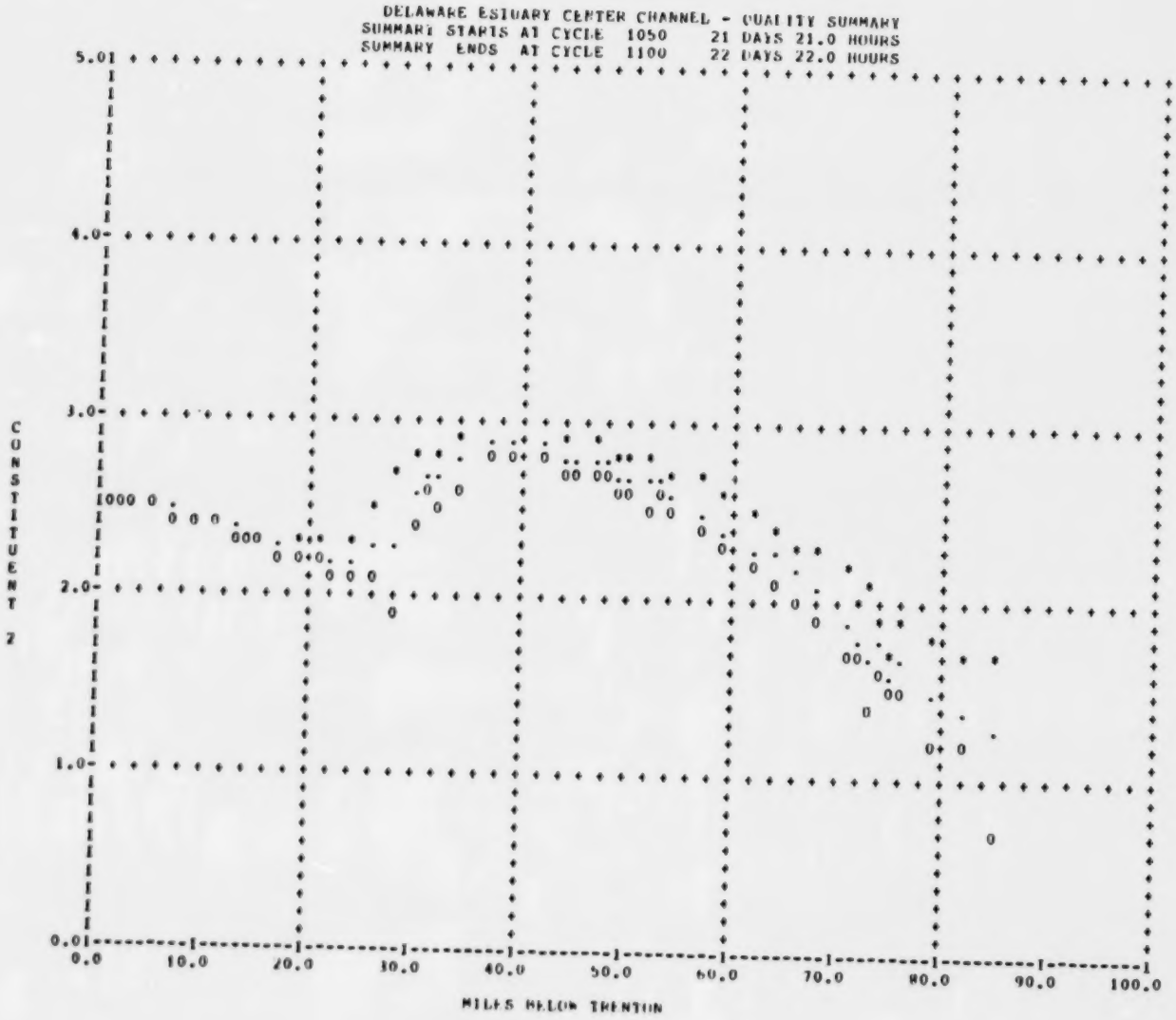


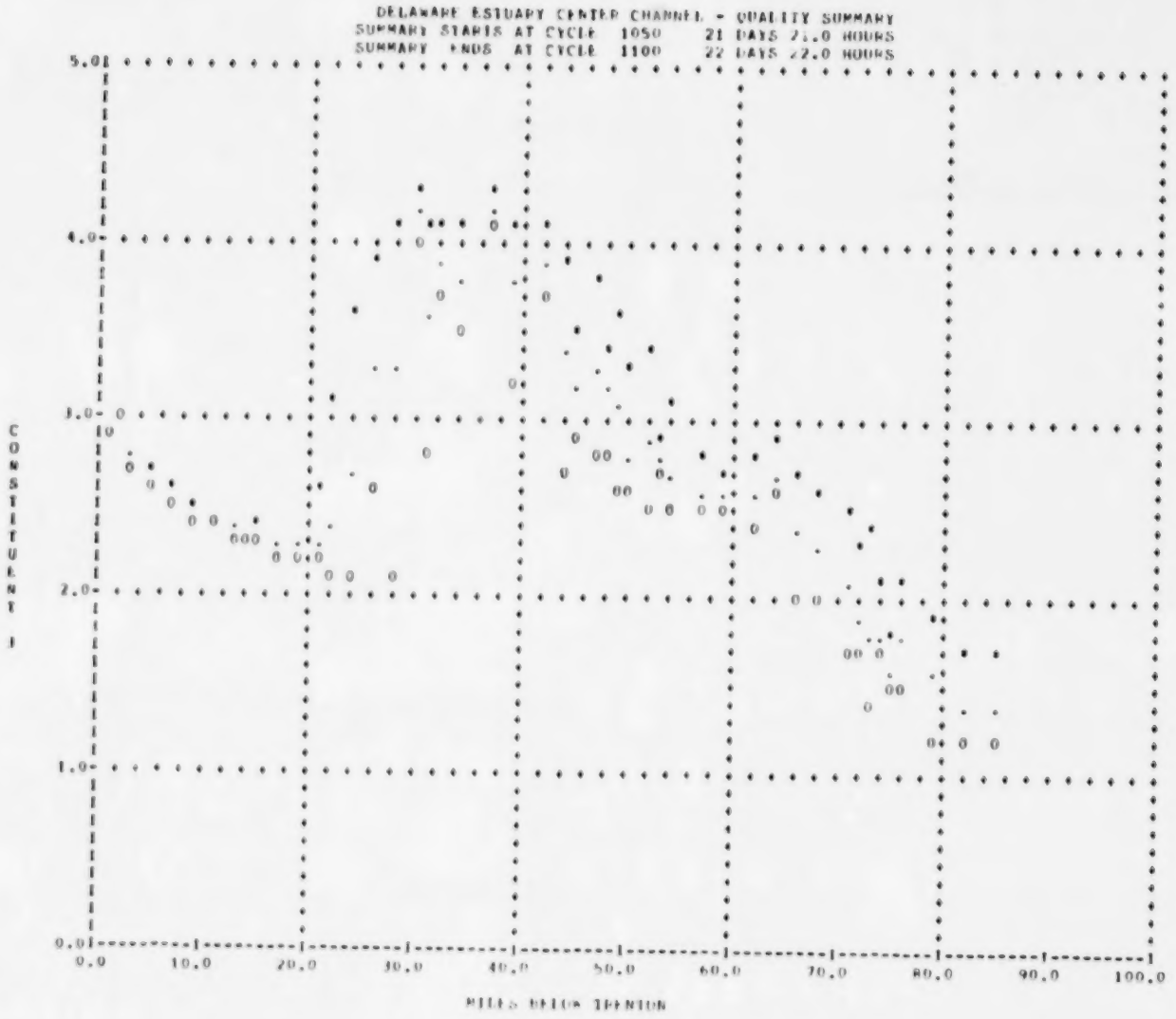
DELAWARE ESTUARY CENTER CHANNEL

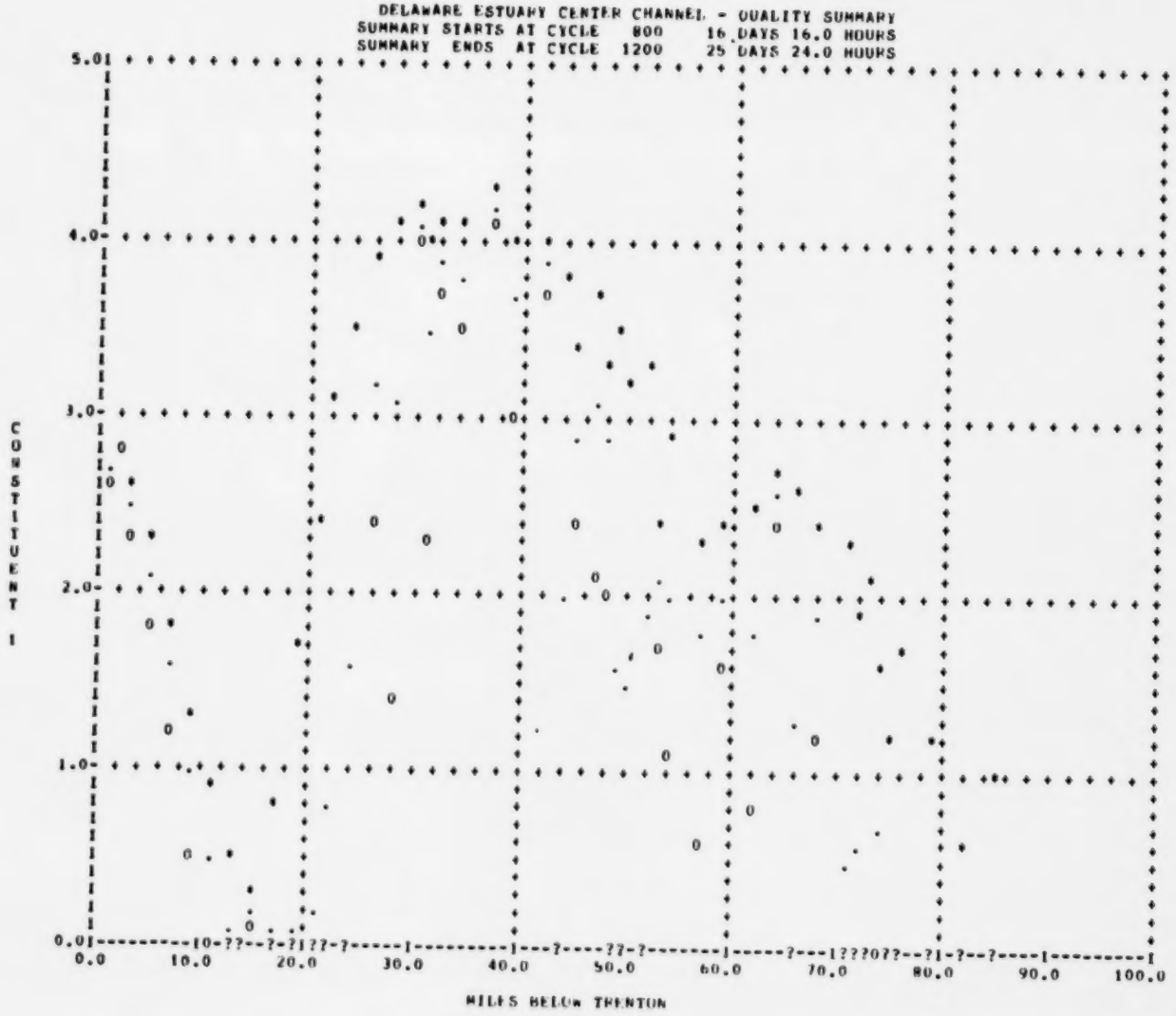
LOW WATER SLACK PLOT FROM CYCLE 1064 TO CYCLE 1074

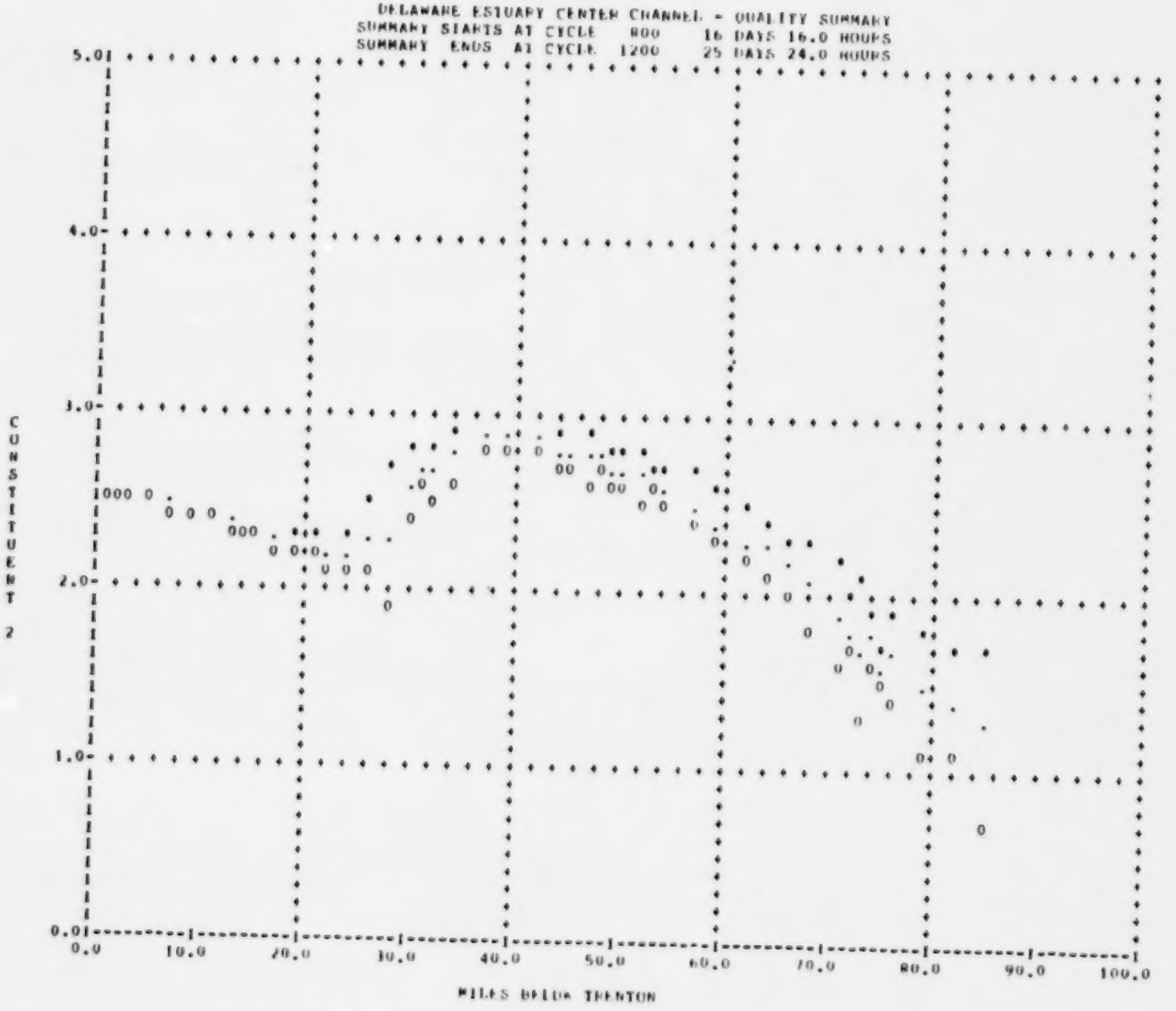


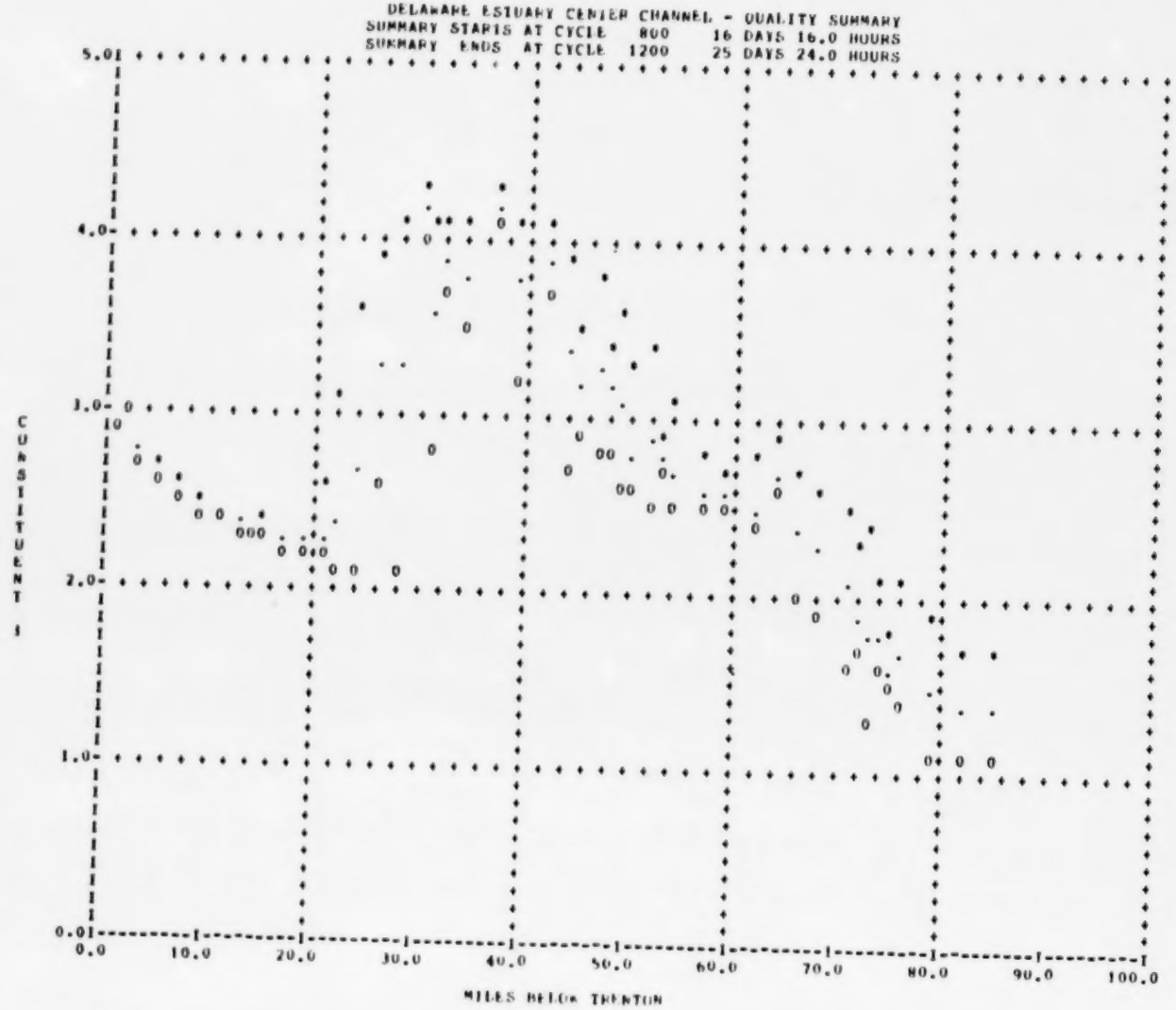

DELAWARE ESTUARY CENTER CHANNEL - QUALITY SUMMARY
SUMMARY STARTS AT CYCLE 1050 21 DAYS 21.0 HOURS
SUMMARY ENDS AT CYCLE 1100 22 DAYS 22.0 HOURS
CONSTITUENT 1
5.0
4.0
3.0
2.0
1.0
0.01
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
MILES BELOW TRENTON

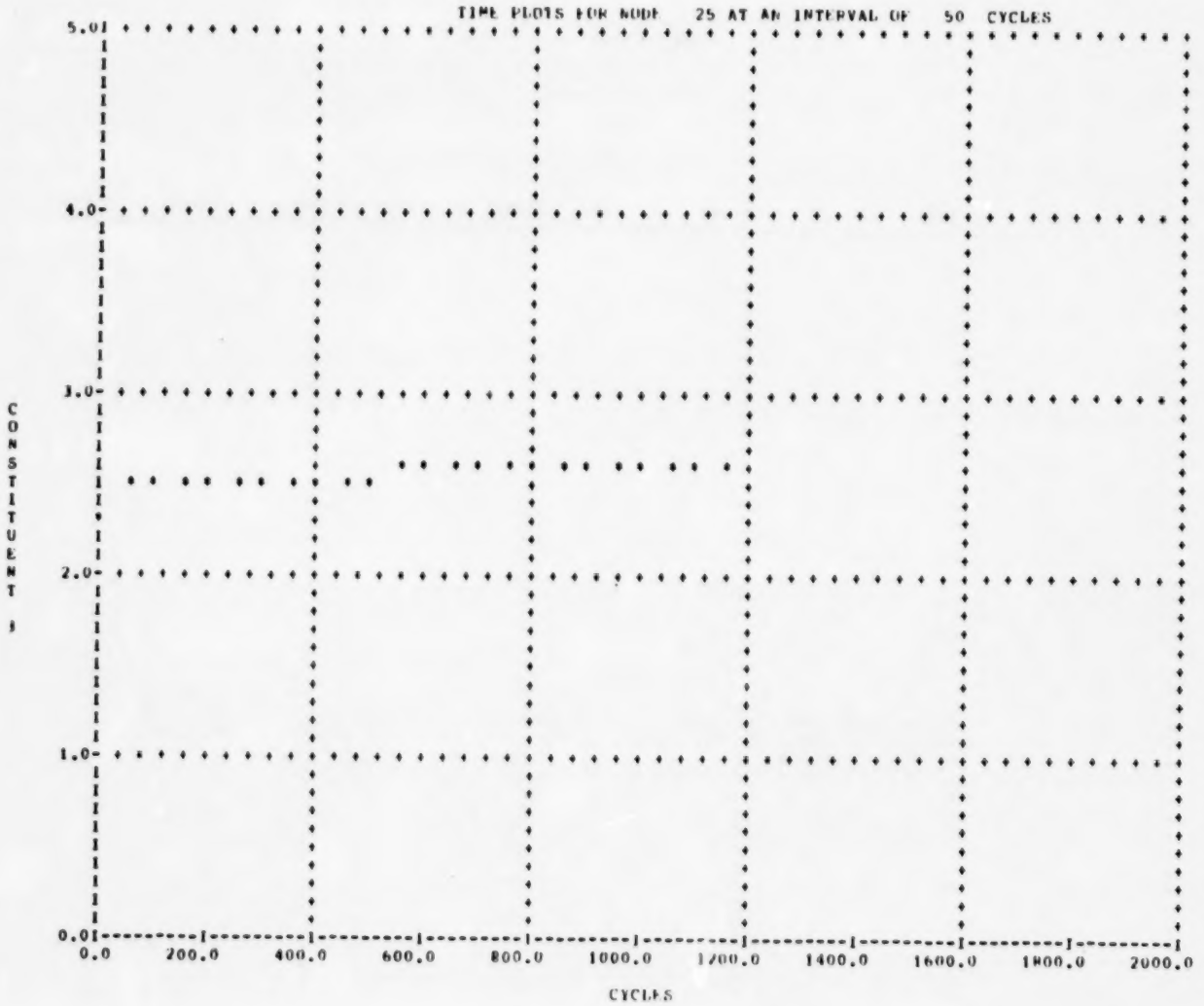

DELAWARE ESTUARY CENTER CHANNEL - QUALITY SUMMARY
SUMMARY STARTS AT CYCLE 1050 21 DAYS 21.0 HOURS
SUMMARY ENDS AT CYCLE 1100 22 DAYS 22.0 HOURS
CONSTITUENT 2
5.0
4.0
3.0
2.0
1.0
0.0
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
MILES BELOW TRENTON

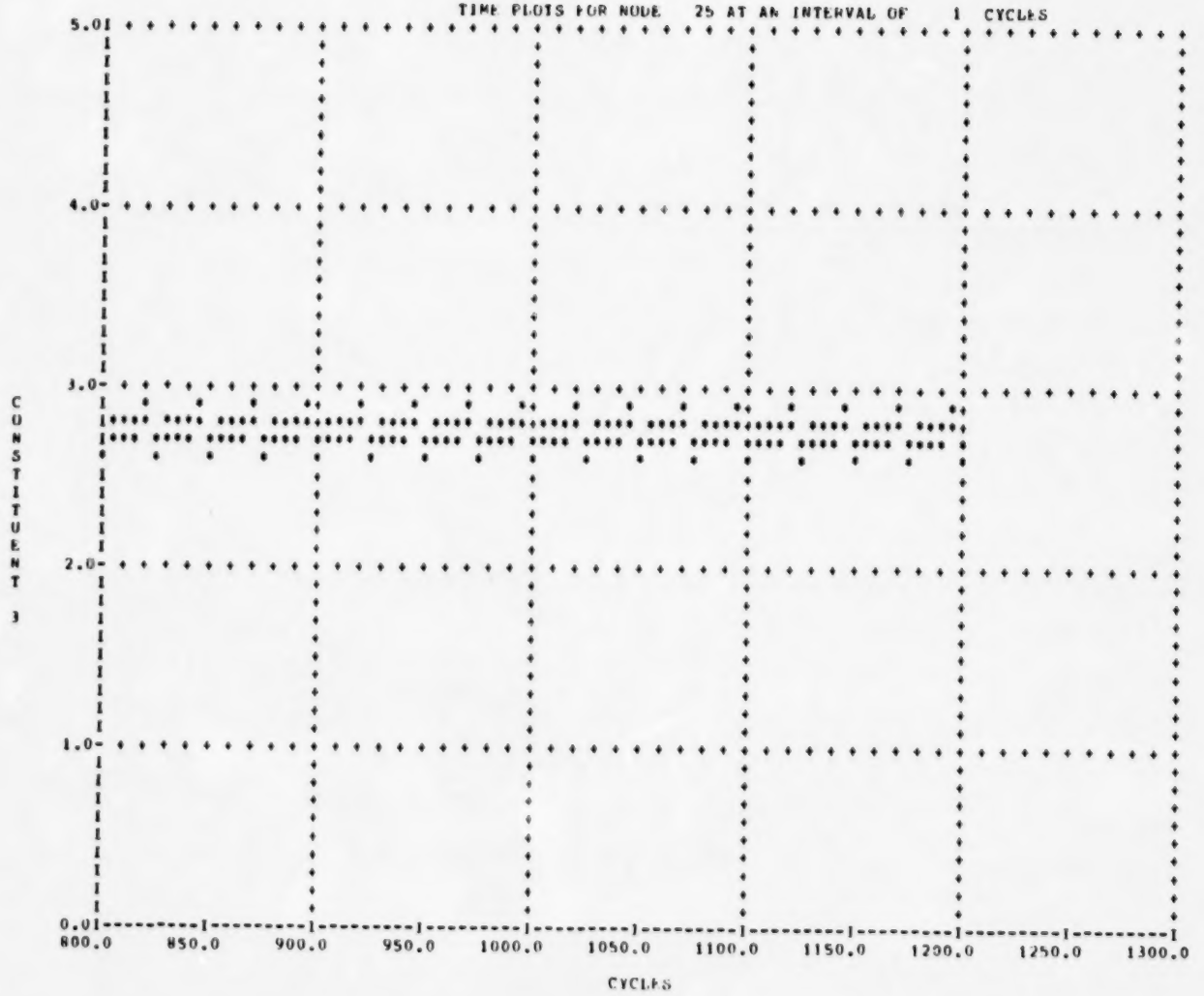

DELAWARE ESTUARY CENTER CHANNEL - QUALITY SUMMARY
SUMMARY STARTS AT CYCLE 1050 21 DAYS 7.0 HOURS
SUMMARY ENDS AT CYCLE 1100 22 DAYS 22.0 HOURS
CONSTITUENT 1
5.0
4.0
3.0
2.0
1.0
0.0
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
MILES UPSTREAM FROMTON

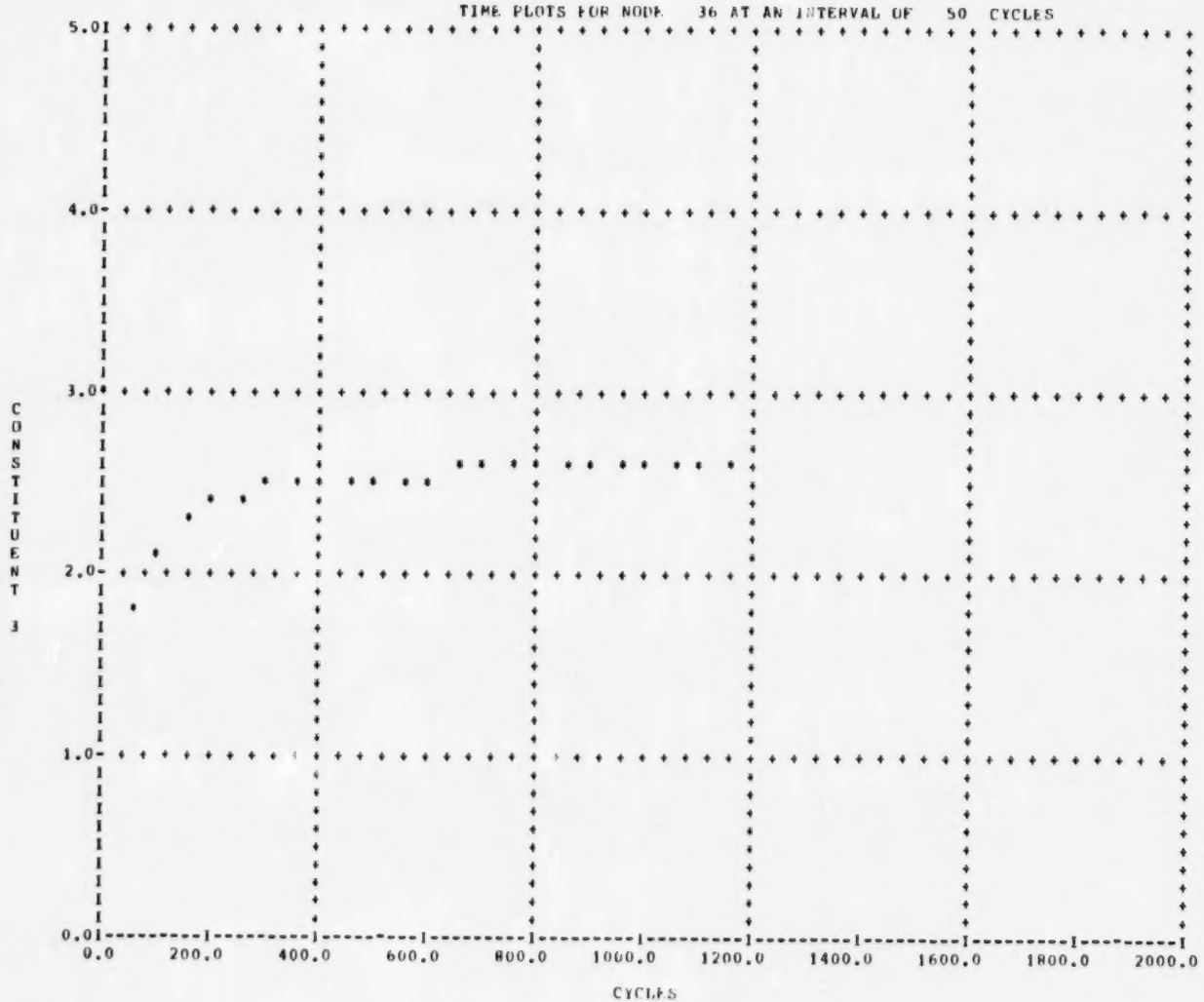

DELAWARE ESTUARY CENTER CHANNEL - QUALITY SUMMARY
SUMMARY STARTS AT CYCLE 800 16 DAYS 16.0 HOURS
SUMMARY ENDS AT CYCLE 1200 25 DAYS 24.0 HOURS
CONSTITUENT 1
5.0
4.0
3.0
2.0
1.0
0.0
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
MILES BELOW TRENTON

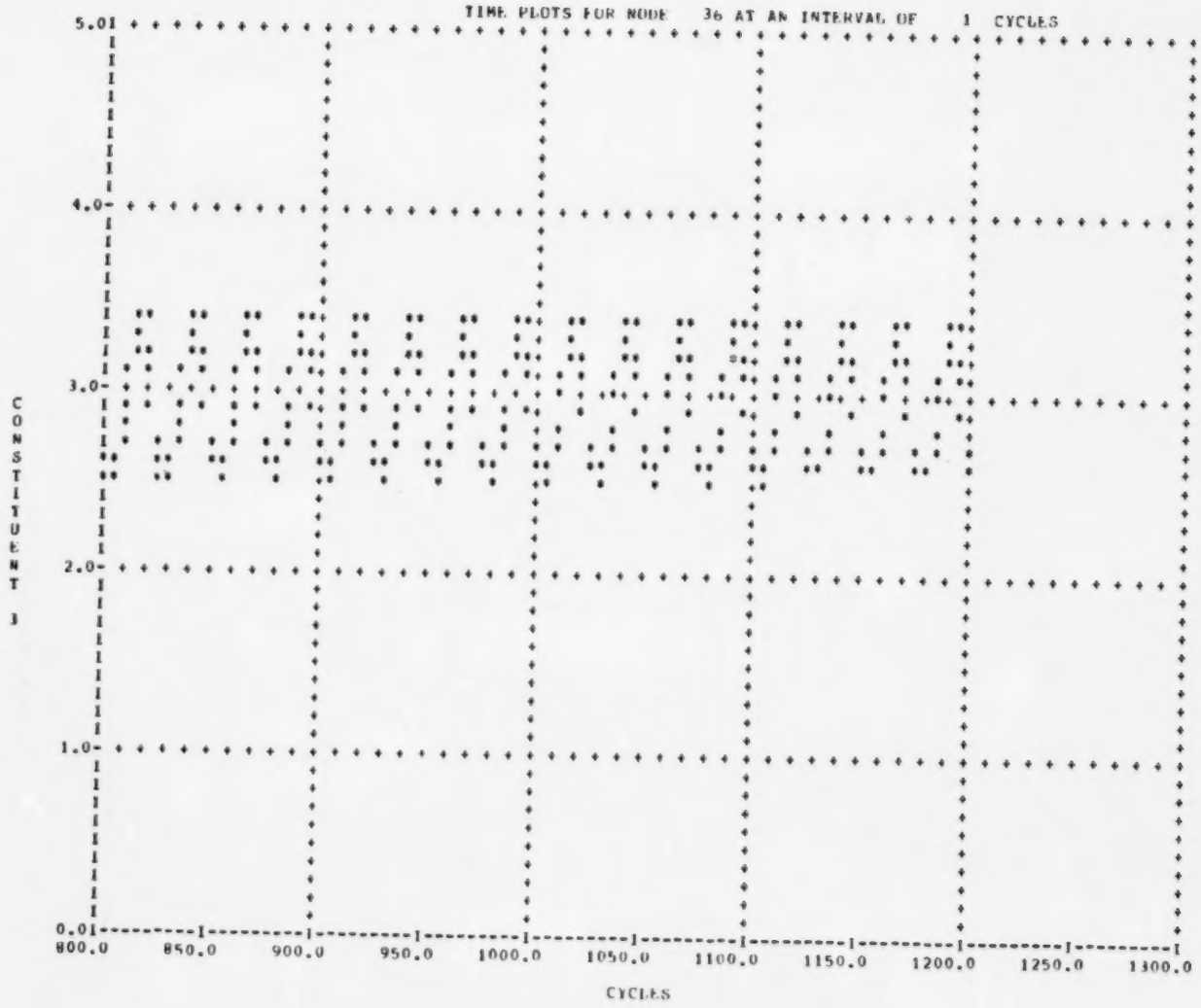

DELAWARE ESTUARY CENTER CHANNEL - QUALITY SUMMARY
SUMMARY STARTS AT CYCLE 800 16 DAYS 16.0 HOURS
SUMMARY ENDS AT CYCLE 1200 25 DAYS 24.0 HOURS
CONSTITUENT 2
5.0
4.0
3.0
2.0
1.0
0.0
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
MILES BELOW TRENTON

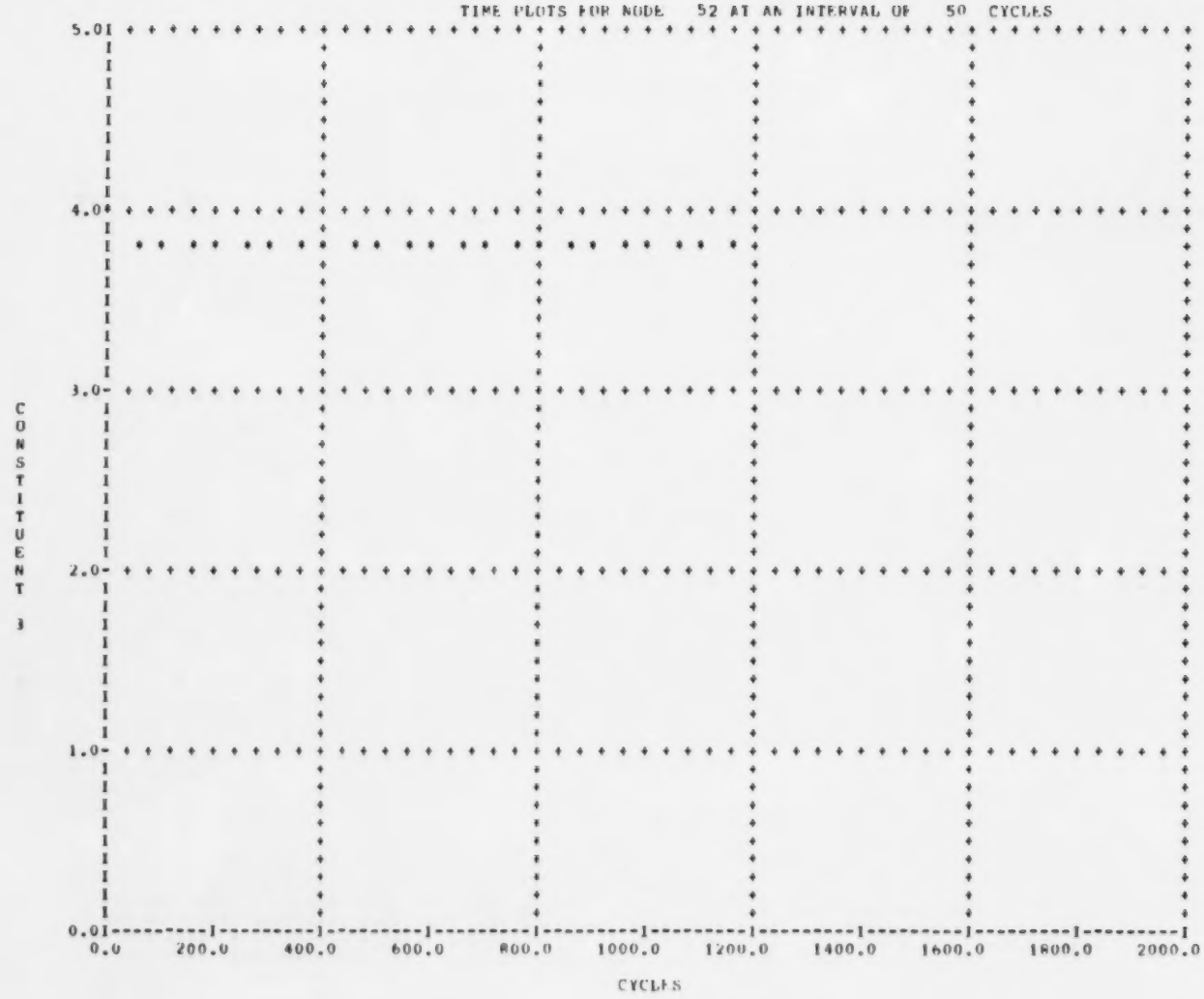

DELAWARE ESTUARY CENTER CHANNEL - QUALITY SUMMARY
SUMMARY STARTS AT CYCLE 800 16 DAYS 16.0 HOURS
SUMMARY ENDS AT CYCLE 1200 25 DAYS 24.0 HOURS
CONSTITUENT 1
5.0
4.0
3.0
2.0
1.0
0.0
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
MILES BELOW TRENTON

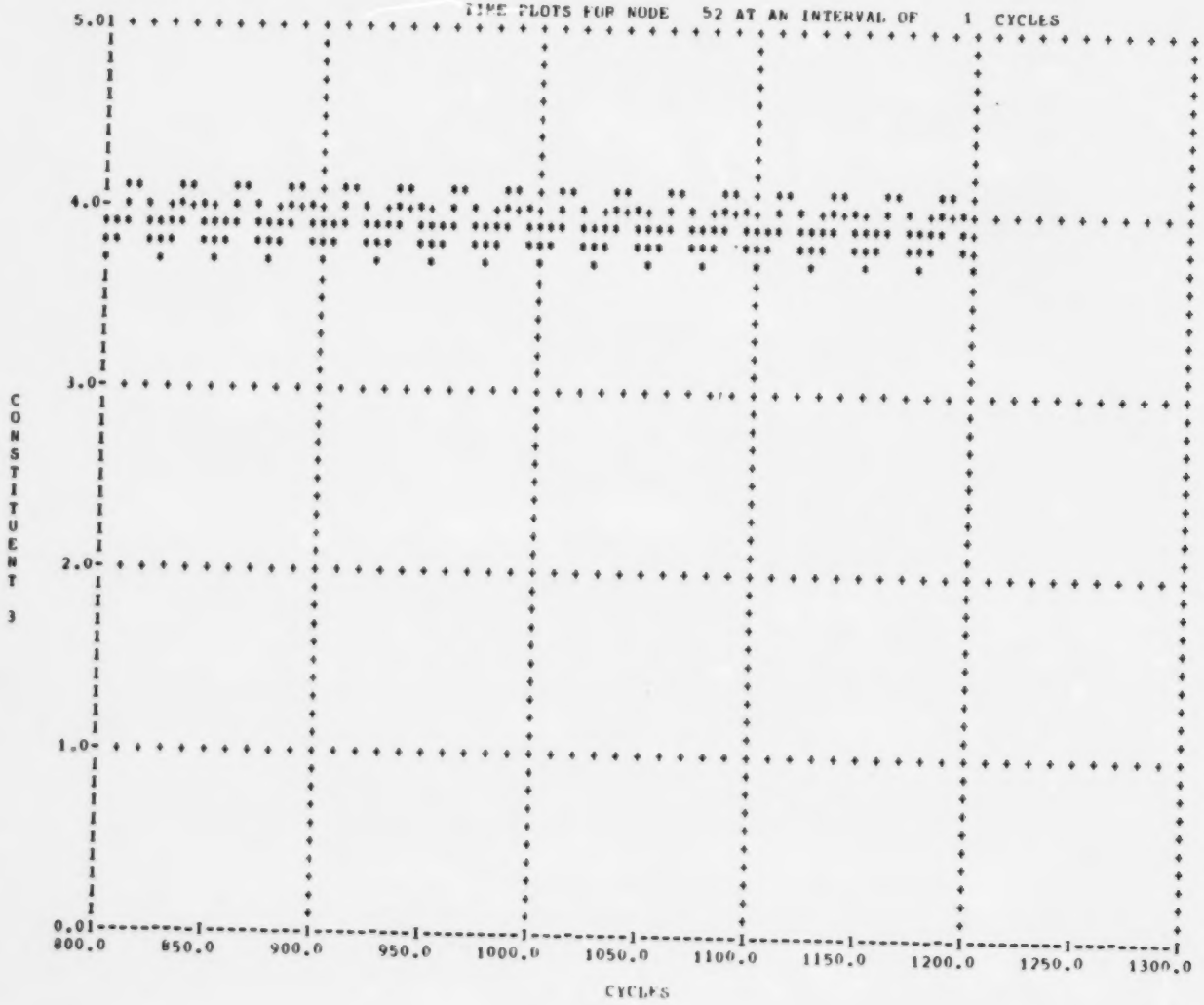

TIME PLOTS FOR NODE 25 AT AN INTERVAL OF 50 CYCLES
5.0
4.0
3.0
2.0
1.0
0.0
CONSTITUENT 1
0.0
200.0
400.0
600.0
800.0
1000.0
1200.0
1400.0
1600.0
1800.0
2000.0
CYCLES

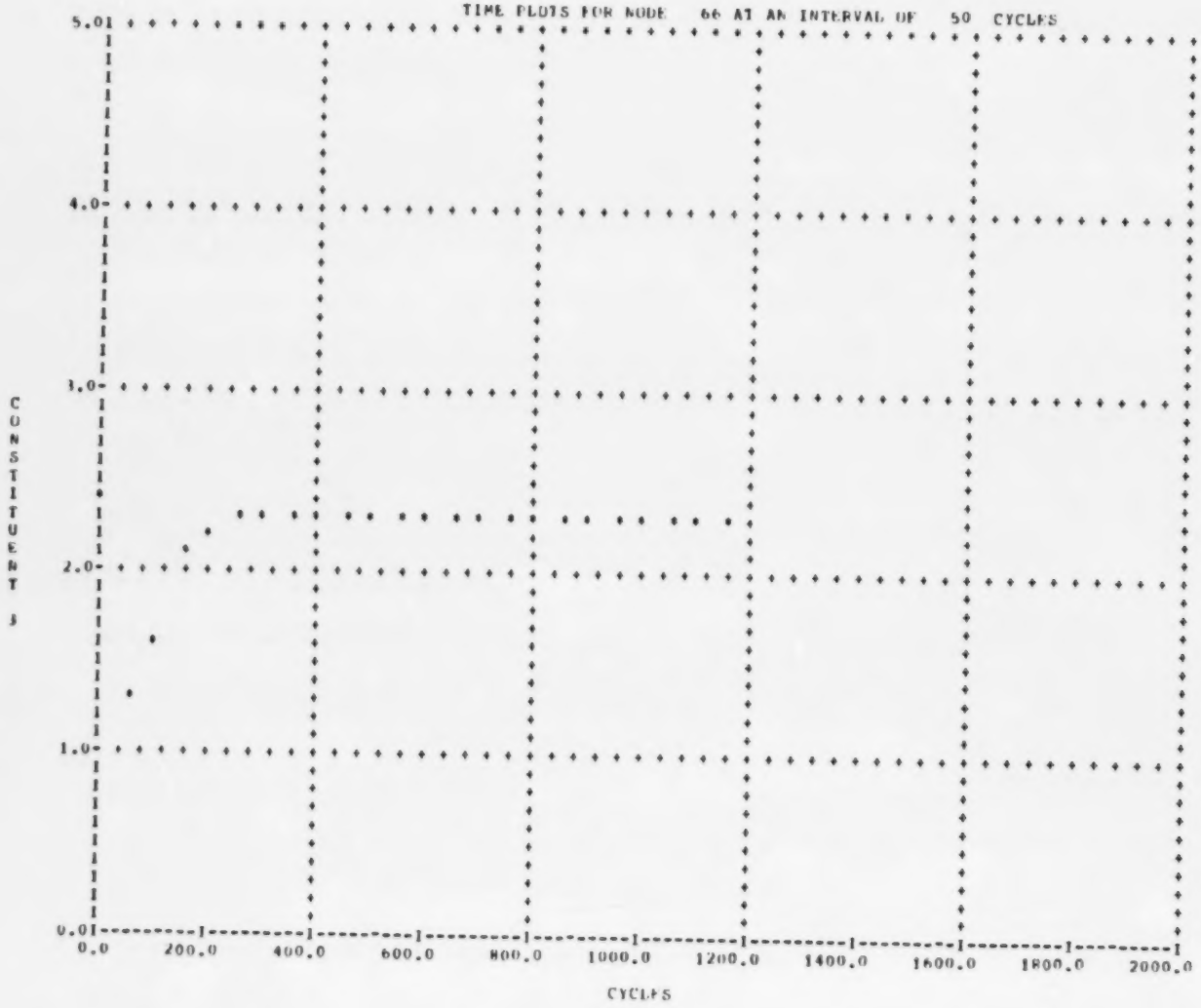

TIME PLOTS FOR NODE 25 AT AN INTERVAL OF 1 CYCLES
5.0
4.0
3.0
2.0
1.0
0.0
CONSTITUENT 3
800.0
850.0
900.0
950.0
1000.0
1050.0
1100.0
1150.0
1200.0
1250.0
1300.0
CYCLES

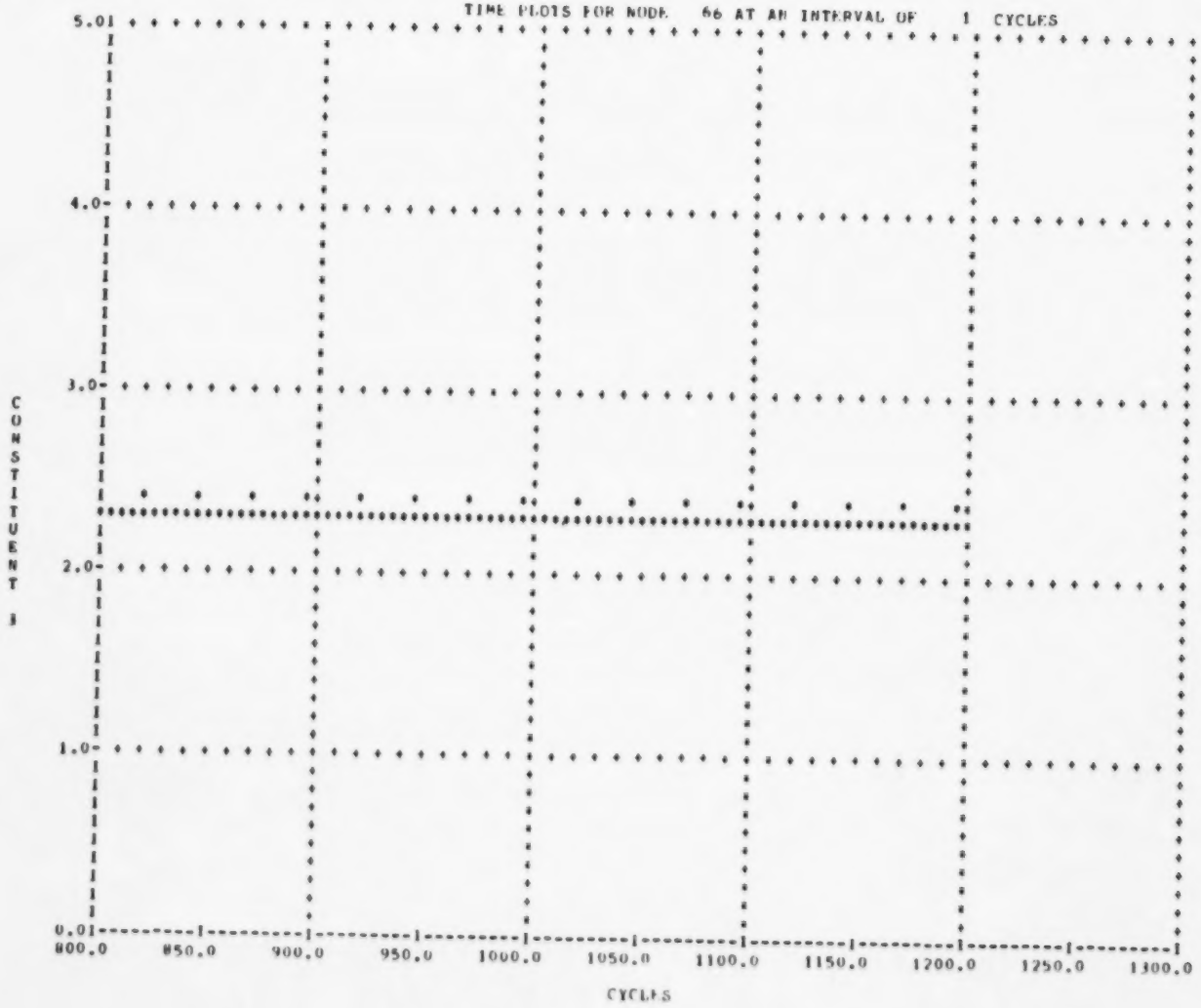

TIME PLOTS FOR NODE 36 AT AN INTERVAL OF 50 CYCLES
5.0
4.0
3.0
2.0
1.0
0.0
CONSTITUENT 3
0.0
200.0
400.0
600.0
800.0
1000.0
1200.0
1400.0
1600.0
1800.0
2000.0
CYCLES


TIME PLOTS FOR NODE 36 AT AN INTERVAL OF 1 CYCLES
5.0
4.0
3.0
2.0
1.0
0.0
CONSTITUENT 3
800.0
850.0
900.0
950.0
1000.0
1050.0
1100.0
1150.0
1200.0
1250.0
1300.0
CYCLES


TIME PLOTS FOR NODE 52 AT AN INTERVAL OF 50 CYCLES
5.0
4.0
3.0
2.0
1.0
0.0
CONSTITUENT 3
0.0
200.0
400.0
600.0
800.0
1000.0
1200.0
1400.0
1600.0
1800.0
2000.0
CYCLES


TIME PLOTS FOR NODE 52 AT AN INTERVAL OF 1 CYCLES
5.01
4.0
3.0
2.0
1.0
0.01
CONSTITUENT 3
800.0
850.0
900.0
950.0
1000.0
1050.0
1100.0
1150.0
1200.0
1250.0
1300.0
CYCLES


TIME PLOTS FOR NODE 66 AT AN INTERVAL OF 50 CYCLES
5.0
4.0
3.0
2.0
1.0
0.0
CONSTITUENT 3
0.0
200.0
400.0
600.0
800.0
1000.0
1200.0
1400.0
1600.0
1800.0
2000.0
CYCLES


TIME PLOTS FOR NODE 66 AT AN INTERVAL OF 1 CYCLES
5.0
4.0
3.0
2.0
1.0
0.0
CONSTITUENT 3
800.0
850.0
900.0
950.0
1000.0
1050.0
1100.0
1150.0
1200.0
1250.0
1300.0
CYCLES

SECTION 2.1 SET PROGRAM CONTROL OPTIONS

DELAWARE ESTUARY (INCLUDING C&D CANAL) HYDRAULIC MODEL ** (76 JUNCTIONS)
DELAWARE RIVER FLOW = 7880 CFS ** SCHUYLKILL RIVER FLOW =2067 CFS
DELAWARE ESTUARY 1-D NETWORK, TRENTON-LISTON POINT, DELAWARE R FLOW = 7880 CFS
SIMULATION PERIOD : AUGUST 1 - 15 , 1975

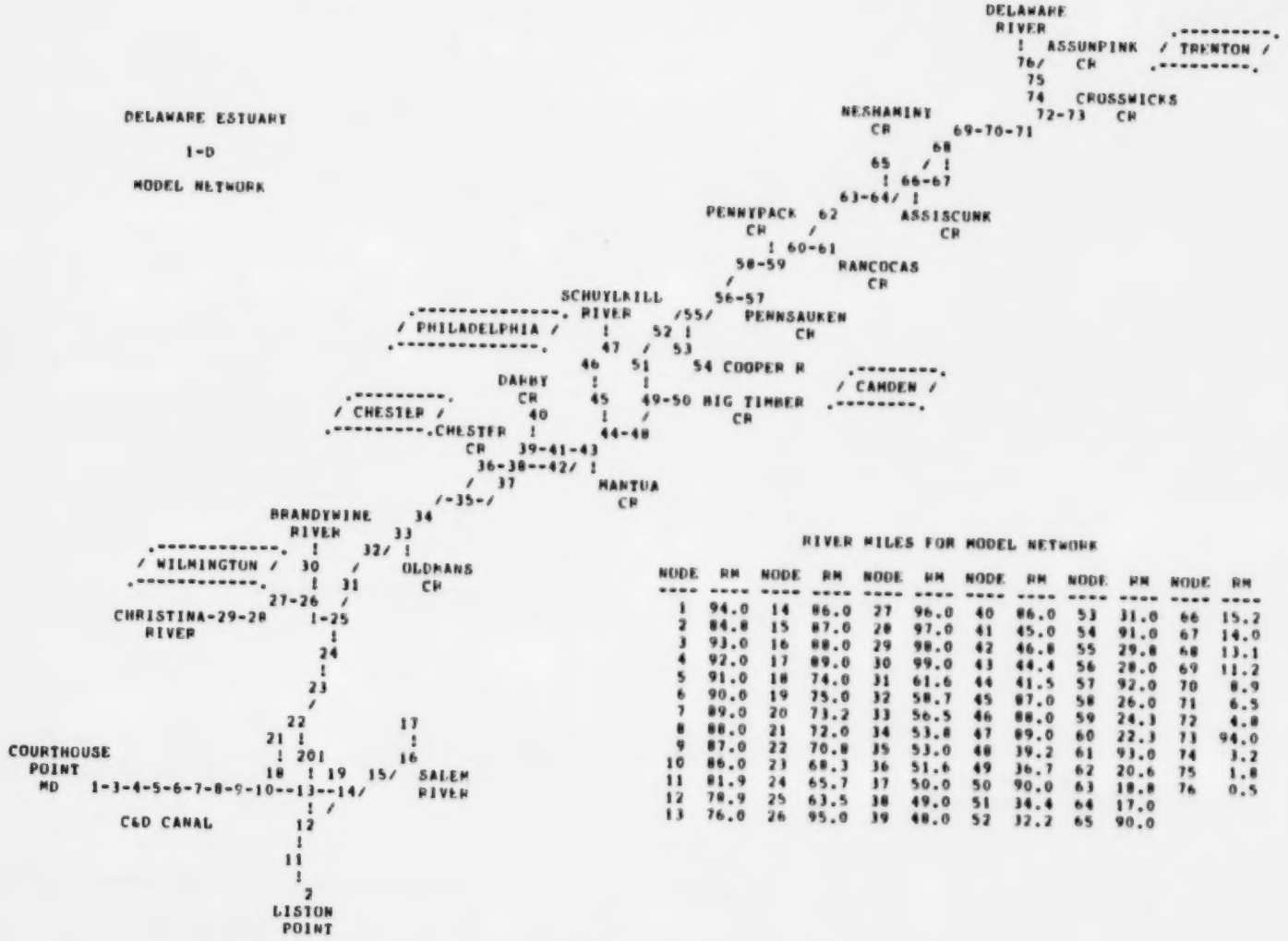
ENVIRONMENTAL PROTECTION AGENCY
DYNAMIC WATER QUALITY MODEL

THIS SIMULATION BEGINS AT 0.0 HOURS
SUNRISE AND SUNSET OCCUR AT 6.00 AND 18.00 HOURS,RESPECTIVELY

******** FROM HYDRAULICS PROGRAM ********

START CYCLE	STOP CYCLE	TIME INTERVAL
150	300	300. SECONDS

STARTING CYCLE ON HYD EXT TAPE	INITIAL QUALITY CYCLE	TOTAL QUALITY CYCLES	DEPLETION OPTION	CORRECT TIME INTERVAL IN QUALITY PROGRAM	START OF FLOOD	START OF EBB	DURATION OF FLOOD	END OF EBB
168	1	1201	1	0.500 HOURS	18	4	11	17



RIVER MILES FOR MODEL NETWORK

NODE	RM	NODE	RM	NODE	RM	NODE	RM	NODE	RM	NODE	RM
1	94.0	14	86.0	27	96.0	40	86.0	53	31.0	66	15.2
2	84.8	15	87.0	28	97.0	41	45.0	54	91.0	67	14.0
3	93.0	16	88.0	29	98.0	42	46.8	55	29.8	68	13.1
4	92.0	17	89.0	30	99.0	43	44.4	56	28.0	69	11.2
5	91.0	18	74.0	31	61.6	44	41.5	57	92.0	70	8.9
6	90.0	19	75.0	32	58.7	45	87.0	58	26.0	71	6.5
7	89.0	20	73.2	33	56.5	46	88.0	59	24.3	72	4.8
8	88.0	21	72.0	34	53.8	47	89.0	60	22.3	73	94.0
9	87.0	22	70.8	35	53.0	48	39.2	61	93.0	74	3.2
10	86.0	23	68.3	36	51.6	49	36.7	62	20.6	75	1.8
11	81.9	24	65.7	37	50.0	50	90.0	63	18.8	76	0.5
12	78.9	25	63.5	38	49.0	51	34.4	64	17.0		
13	76.0	26	95.0	39	48.0	52	32.2	65	90.0		

THE FOLLOWING 8 JUNCTIONS HAVE TIME PLOTS

JUNCTION	STARTING CYCLE	ENDING CYCLE	CYCLE INTERVAL (1=PLOT 0=NO PLOT)	CON1	CON2	CON3	CON4	CON5
25	1	1200	50	0	1	1	1	1
25	800	1200	1	0	0	0	0	1
36	1	1200	50	0	1	0	1	1
36	800	1200	1	0	0	0	0	1
52	1	1200	50	0	1	0	1	1
52	800	1200	1	0	0	0	0	1
66	1	1200	50	0	1	0	1	1
66	800	1200	1	0	0	0	0	1

SECTION 2.2 DEFINE WATER QUALITY CONSTITUENTS

THIS RUN CONSIDERS 5 CONSTITUENTS

CONSTITUENT 1 IS NORG (MG/L)

CONSTITUENT 2 IS NH3 (MG/L)

CONSTITUENT 3 IS NO3 (MG/L)

CONSTITUENT 4 IS CBOD (MG/L)

CONSTITUENT 5 IS DO (MG/L)

***** TABLE OF TRANSFER COEFFICIENTS AND FUNCTION OPERATORS *****

CNST(K)	CO(1,K)	CO(2,K)	CO(3,K)	CO(4,K)	CO(5,K)	FUNC1	FUNC2	FUNC3	FUNC4	FUNC5	FUNC6	FUNC7	FUNC8	FUNC9	FUNC10	FUNC11	FUNC12
1	-1.00	0.0	1.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.00	0.0
2	1.00	-1.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	1.00	-1.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.00
4	0.0	0.0	0.0	-1.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.00	0.0	0.0
5	0.0	-4.57	0.0	-1.00	0.0	1.00	-1.00	0.0	0.0	1.00	-1.00	0.0	0.0	0.0	0.0	0.0	2.86

THE TEMPERATURE FROM CYCLE 1 THROUGH CYCLE 2400 IS 27.0 DEGREES C

********** NOTES ON SPECIAL REACTION LINKAGES **********

THE DENITRIFICATION RATE (DNK) IS DETERMINED BY TEMP AND DO AS FOLLOWS
   FOR DO LEVELS ABOVE   1.00 MG/L, DNK = 0
   FOR DO LEVELS BETWEEN   1.00 AND   0.20 DNK INCREASES LINEARLY FROM ZERO TO 0.110 /DAY
   FOR DO LEVELS BELOW   0.20 MG/L, DNK INCREASES LINEARLY TO   0.28 /DAY
THETA USED FOR TEMPERATURE CORRECTION IS 1.120

REOXYGENATION CONSTANT FOR CONSTITUENT 5 COMPUTED BY O'CONNOR-DOBBINS RELATIONSHIP K2 = 12.9*V**0.5 / H**1.5
K1 AND K2 HAVE BEEN CORRECTED TO 27.00 DEGREES CENTIGRADE

THE DO SATURATION FOR CONSTITUENT   5 AT 27.00 DEG.C IS 7.871

THE SOD RATE (BENTH) IS MODIFIED BY TEMP AND DO AS FOLLOWS
   FOR DO LEVELS ABOVE   2.00 MG/L, THE SOD RATE IS UNCHANGED
   FOR DO LEVELS BELOW   2.00 SOD = BENTH*(DO/ 2.00)** 0.45
THE THETA USED FOR TEMPERATURE CORRECTION IS 1.050

TABLE OF DECAY RATES (AT 20. C)

SIMULATION PERIOD : AUGUST 1 - 15 , 1975

CONSTITUENT 1 IS NORG (MG/L)

CONSTITUENT 2 IS NH3 (MG/L)

CONSTITUENT 3 IS NO3 (MG/L)

CONSTITUENT 4 IS CBOD (MG/L)

CONSTITUENT 5 IS DO (MG/L)

	******** PRIMARY DECAY RATES 1/DAY (BASE E)					******* SECONDARY DECAY 1/DAY		********** SPECIAL DO BUDGET RATES AND PARAMETERS **********							
NODE	CONST1	CONST2	CONST3	CONST4	CONST5	CONST4	CONST1	WINDSP MPH	WINDOX 1/DAY	SOD G/MM/D	CHLORO UG/L	PHOTO MG/CHLORO/D	RESP	DEPTHP FT	DEPTH FT
1	0.070	0.040	0.020	0.230	0.319	0.050	0.120	0.0	0.0	1.00	25.00	0.079	0.017	5.50	12.93
2	0.070	0.200	0.020	0.230	0.272	0.050	0.120	0.0	0.0	1.00	25.00	0.079	0.017	5.50	16.37
3	0.070	0.040	0.020	0.230	0.193	0.050	0.120	0.0	0.0	1.00	25.00	0.079	0.017	5.50	18.61
4	0.070	0.040	0.020	0.230	0.112	0.050	0.120	0.0	0.0	1.00	25.00	0.079	0.017	5.50	28.75
5	0.070	0.040	0.020	0.230	0.121	0.050	0.120	0.0	0.0	1.00	25.00	0.079	0.017	5.50	28.59
6	0.070	0.040	0.020	0.230	0.124	0.050	0.120	0.0	0.0	1.00	25.00	0.079	0.017	5.50	28.34
7	0.070	0.040	0.020	0.230	0.151	0.050	0.120	0.0	0.0	1.00	25.00	0.079	0.017	5.50	25.57
8	0.070	0.040	0.020	0.230	0.204	0.050	0.120	0.0	0.0	1.00	25.00	0.079	0.017	5.50	21.79
9	0.070	0.040	0.020	0.230	0.253	0.050	0.120	0.0	0.0	1.00	25.00	0.079	0.017	5.50	19.32
10	0.070	0.040	0.020	0.230	0.210	0.050	0.120	0.0	0.0	1.00	25.00	0.079	0.017	5.50	17.52
11	0.070	0.200	0.020	0.230	0.288	0.020	0.120	0.0	0.0	0.60	25.00	0.079	0.017	5.50	15.94
12	0.070	0.200	0.020	0.230	0.362	0.020	0.120	0.0	0.0	0.60	25.00	0.079	0.017	5.50	14.62
13	0.070	0.200	0.020	0.230	0.335	0.020	0.120	0.0	0.0	0.60	25.00	0.079	0.017	5.50	15.23
14	0.070	0.040	0.020	0.230	0.884	0.050	0.120	0.0	0.0	1.00	25.00	0.079	0.017	5.50	6.95
15	0.070	0.040	0.020	0.230	0.889	0.050	0.120	0.0	0.0	1.00	25.00	0.079	0.017	5.50	7.75
16	0.070	0.040	0.020	0.230	0.506	0.050	0.120	0.0	0.0	1.00	25.00	0.079	0.017	5.50	7.57
17	0.070	0.040	0.020	0.230	0.356	0.050	0.120	0.0	0.0	1.00	25.00	0.079	0.017	5.50	7.58
18	0.070	0.200	0.020	0.230	0.554	0.020	0.120	0.0	0.0	0.60	25.00	0.079	0.017	5.50	10.56
19	0.070	0.200	0.020	0.230	0.652	0.020	0.120	0.0	0.0	0.60	25.00	0.079	0.017	5.50	6.94
20	0.070	0.200	0.020	0.230	0.327	0.020	0.120	0.0	0.0	0.60	25.00	0.079	0.017	5.50	15.92
21	0.070	0.200	0.020	0.230	0.466	0.020	0.120	0.0	0.0	0.60	25.00	0.079	0.017	5.50	10.64
22	0.070	0.200	0.020	0.230	0.297	0.020	0.120	0.0	0.0	0.60	25.00	0.079	0.017	5.50	15.57
23	0.070	0.200	0.020	0.230	0.244	0.020	0.120	0.0	0.0	0.60	75.00	0.079	0.017	8.00	17.14
24	0.070	0.200	0.020	0.230	0.201	0.020	0.120	0.0	0.0	0.60	75.00	0.079	0.017	8.00	19.22
25	0.070	0.200	0.020	0.230	0.192	0.020	0.120	0.0	0.0	0.60	75.00	0.079	0.017	8.00	19.21
26	0.070	0.040	0.020	0.230	0.245	0.050	0.120	0.0	0.0	1.00	75.00	0.079	0.017	8.00	11.41
27	0.070	0.040	0.020	0.230	0.347	0.050	0.120	0.0	0.0	1.00	75.00	0.079	0.017	8.00	9.99
28	0.070	0.040	0.020	0.230	0.448	0.050	0.120	0.0	0.0	1.00	75.00	0.079	0.017	8.00	8.82
29	0.070	0.040	0.020	0.230	0.473	0.050	0.120	0.0	0.0	1.00	75.00	0.079	0.017	8.00	8.23
30	0.070	0.040	0.020	0.230	0.550	0.050	0.120	0.0	0.0	1.00	75.00	0.079	0.017	8.00	5.76
31	0.070	0.200	0.020	0.230	0.216	0.020	0.120	0.0	0.0	0.60	75.00	0.079	0.017	8.00	17.71
32	0.070	0.200	0.020	0.230	0.243	0.020	0.120	0.0	0.0	1.00	75.00	0.079	0.017	8.00	16.80
33	0.070	0.200	0.020	0.230	0.215	0.020	0.120	0.0	0.0	1.00	125.00	0.079	0.017	10.00	18.13
34	0.070	0.200	0.020	0.230	0.178	0.020	0.120	0.0	0.0	1.00	125.00	0.079	0.017	10.00	19.87

35	0.070	0.200	0.020	0.230	0.222	0.020	0.120	0.0	0.0	1.00	125.00	0.079	0.017	10.00	13.41
36	0.070	0.200	0.020	0.230	0.172	0.020	0.120	0.0	0.0	1.00	125.00	0.079	0.017	10.00	21.10
37	0.070	0.200	0.020	0.230	0.652	0.020	0.120	0.0	0.0	1.00	125.00	0.079	0.017	10.00	7.52
38	0.070	0.200	0.020	0.230	0.217	0.020	0.120	0.0	0.0	1.60	125.00	0.079	0.017	10.00	17.23
39	0.070	0.200	0.020	0.230	0.461	0.020	0.120	0.0	0.0	1.60	125.00	0.079	0.017	10.00	9.24
40	0.070	0.040	0.020	0.230	0.760	0.050	0.120	0.0	0.0	1.00	125.00	0.079	0.017	10.00	6.00
41	0.070	0.060	0.020	0.230	0.369	0.020	0.150	0.0	0.0	1.60	125.00	0.079	0.017	10.00	10.50
42	0.070	0.200	0.020	0.230	0.175	0.020	0.120	0.0	0.0	1.60	125.00	0.079	0.017	10.00	20.19
43	0.070	0.060	0.020	0.230	0.174	0.070	0.150	0.0	0.0	1.60	125.00	0.079	0.017	10.00	20.10
44	0.070	0.060	0.020	0.230	0.152	0.070	0.150	0.0	0.0	1.60	50.00	0.079	0.017	10.00	21.61
45	0.070	0.040	0.020	0.230	0.173	0.050	0.120	0.0	0.0	1.00	50.00	0.079	0.017	10.00	14.28
46	0.070	0.040	0.020	0.230	0.131	0.050	0.120	0.0	0.0	1.00	50.00	0.079	0.017	10.00	15.06
47	0.070	0.040	0.020	0.230	0.145	0.050	0.120	0.0	0.0	1.00	50.00	0.079	0.017	10.00	13.24
48	0.070	0.060	0.020	0.230	0.145	0.070	0.150	0.0	0.0	1.60	50.00	0.079	0.017	10.00	22.64
49	0.070	0.060	0.020	0.230	0.127	0.070	0.150	0.0	0.0	2.70	50.00	0.079	0.017	10.00	25.19
50	0.070	0.040	0.020	0.230	0.165	0.050	0.120	0.0	0.0	1.00	50.00	0.079	0.017	10.00	12.69
51	0.070	0.020	0.020	0.230	0.106	0.070	0.150	0.0	0.0	2.70	12.50	0.079	0.017	10.00	27.24
52	0.070	0.020	0.020	0.230	0.119	0.070	0.150	0.0	0.0	2.70	12.50	0.079	0.017	10.00	23.42
53	0.070	0.020	0.020	0.230	0.244	0.070	0.150	0.0	0.0	2.70	12.50	0.079	0.017	10.00	12.18
54	0.070	0.040	0.020	0.230	0.478	0.050	0.120	0.0	0.0	1.00	12.50	0.079	0.017	10.00	6.97
55	0.070	0.020	0.020	0.230	0.148	0.070	0.150	0.0	0.0	2.70	12.50	0.079	0.017	10.00	19.90
56	0.070	0.020	0.020	0.230	0.158	0.070	0.150	0.0	0.0	2.70	12.50	0.079	0.017	10.00	20.49
57	0.070	0.040	0.020	0.230	0.130	0.050	0.120	0.0	0.0	1.00	12.50	0.079	0.017	10.00	11.51
58	0.070	0.200	0.020	0.230	0.147	0.070	0.150	0.0	0.0	1.00	12.50	0.079	0.017	10.00	21.29
59	0.070	0.200	0.020	0.230	0.153	0.070	0.150	0.0	0.0	1.00	12.50	0.079	0.017	8.00	20.44
60	0.070	0.200	0.020	0.180	0.182	0.020	0.070	0.0	0.0	0.50	12.50	0.079	0.017	8.00	17.87
61	0.070	0.040	0.020	0.230	0.124	0.050	0.120	0.0	0.0	1.00	12.50	0.079	0.017	8.00	13.77
62	0.070	0.200	0.020	0.180	0.174	0.020	0.070	0.0	0.0	0.50	12.50	0.079	0.017	8.00	17.81
63	0.070	0.200	0.020	0.180	0.152	0.020	0.070	0.0	0.0	0.50	12.50	0.079	0.017	8.00	19.48
64	0.070	0.200	0.020	0.180	0.130	0.020	0.070	0.0	0.0	0.50	12.50	0.079	0.017	8.00	21.29
65	0.070	0.040	0.020	0.230	0.104	0.050	0.120	0.0	0.0	1.00	12.50	0.079	0.017	8.00	13.86
66	0.070	0.200	0.020	0.180	0.113	0.020	0.070	0.0	0.0	0.50	12.50	0.079	0.017	8.00	22.27
67	0.070	0.200	0.020	0.180	0.128	0.020	0.070	0.0	0.0	0.50	12.50	0.079	0.017	8.00	16.71
68	0.070	0.060	0.020	0.180	0.108	0.020	0.070	0.0	0.0	0.50	12.50	0.079	0.017	8.00	22.33
69	0.070	0.060	0.020	0.180	0.099	0.020	0.070	0.0	0.0	1.00	12.50	0.079	0.017	9.00	23.81
70	0.070	0.060	0.020	0.180	0.100	0.020	0.070	0.0	0.0	1.00	12.50	0.079	0.017	9.00	22.42
71	0.070	0.060	0.020	0.180	0.121	0.020	0.070	0.0	0.0	1.00	12.50	0.079	0.017	9.00	19.10
72	0.070	0.060	0.020	0.180	0.153	0.020	0.070	0.0	0.0	1.00	12.50	0.079	0.017	9.00	15.42
73	0.070	0.040	0.020	0.230	0.122	0.050	0.120	0.0	0.0	1.00	12.50	0.079	0.017	9.00	11.48
74	0.070	0.040	0.020	0.180	0.153	0.020	0.070	0.0	0.0	2.50	12.50	0.079	0.017	9.00	14.59
75	0.070	0.040	0.020	0.180	0.214	0.070	0.070	0.0	0.0	2.50	12.50	0.079	0.017	9.00	13.12
76	0.070	0.040	0.020	0.180	0.316	0.070	0.070	0.0	0.0	2.50	12.50	0.079	0.017	9.00	11.20

TEMPERATURE CORRECTION FACTORS , THETA

1.047	1.085	1.160	1.047	1.025	1.000	1.000	1.000	1.000	1.050	1.000	1.085	1.085	1.000	1.000

TABLE OF DECAY RATES (AT 27. C)

SIMULATION PERIOD : AUGUST 1 - 15 , 1975

CONSTITUENT 1 IS NORG (MG/L)

CONSTITUENT 2 IS NH3 (MG/L)

CONSTITUENT 3 IS NO3 (MG/L)

CONSTITUENT 4 IS CBOD (MG/L)

CONSTITUENT 5 IS DO (MG/L)

	******** PRIMARY DECAY RATES 1/DAY (BASE E) ********					SECONDARY DECAY 1/DAY		********** SPECIAL DO BUDGET RATES AND PARAMETERS **********							
NODE	CONST1	CONST2	CONST3	CONST4	CONST5	CONST4	CONST1	WINDSP MPH	WINDOX 1/DAY	SOD G/MM/D	CHLORO UG/L	PHOTO MG/CHLORO/D	RESP	DEPTHP FT	DEPTH FT
1	0.097	0.071	0.057	0.317	0.380	0.050	0.120	0.0	0.0	1.41	25.00	0.140	0.030	5.50	12.93
2	0.097	0.354	0.057	0.317	0.324	0.050	0.120	0.0	0.0	1.41	25.00	0.140	0.030	5.50	16.37
3	0.097	0.071	0.057	0.317	0.230	0.050	0.120	0.0	0.0	1.41	25.00	0.140	0.030	5.50	18.61
4	0.097	0.071	0.057	0.317	0.133	0.050	0.120	0.0	0.0	1.41	25.00	0.140	0.030	5.50	28.75
5	0.097	0.071	0.057	0.317	0.144	0.050	0.120	0.0	0.0	1.41	25.00	0.140	0.030	5.50	28.59
6	0.097	0.071	0.057	0.317	0.147	0.050	0.120	0.0	0.0	1.41	25.00	0.140	0.030	5.50	28.34
7	0.097	0.071	0.057	0.317	0.179	0.050	0.120	0.0	0.0	1.41	25.00	0.140	0.030	5.50	25.57
8	0.097	0.071	0.057	0.317	0.242	0.050	0.120	0.0	0.0	1.41	25.00	0.140	0.030	5.50	21.79
9	0.097	0.071	0.057	0.317	0.301	0.050	0.120	0.0	0.0	1.41	25.00	0.140	0.030	5.50	19.32
10	0.097	0.071	0.057	0.317	0.249	0.050	0.120	0.0	0.0	1.41	25.00	0.140	0.030	5.50	17.52
11	0.097	0.354	0.057	0.317	0.343	0.020	0.120	0.0	0.0	0.84	25.00	0.140	0.030	5.50	15.94
12	0.097	0.354	0.057	0.317	0.431	0.020	0.120	0.0	0.0	0.84	25.00	0.140	0.030	5.50	14.62
13	0.097	0.354	0.057	0.317	0.399	0.020	0.120	0.0	0.0	0.84	25.00	0.140	0.030	5.50	15.23
14	0.097	0.071	0.057	0.317	1.051	0.050	0.120	0.0	0.0	1.41	25.00	0.140	0.030	5.50	6.95
15	0.097	0.071	0.057	0.317	1.056	0.050	0.120	0.0	0.0	1.41	25.00	0.140	0.030	5.50	7.75
16	0.097	0.071	0.057	0.317	0.601	0.050	0.120	0.0	0.0	1.41	25.00	0.140	0.030	5.50	7.57
17	0.097	0.071	0.057	0.317	0.424	0.050	0.120	0.0	0.0	1.41	25.00	0.140	0.030	5.50	7.58
18	0.097	0.354	0.057	0.317	0.659	0.020	0.120	0.0	0.0	0.84	25.00	0.140	0.030	5.50	10.56
19	0.097	0.354	0.057	0.317	0.776	0.020	0.120	0.0	0.0	0.84	25.00	0.140	0.030	5.50	6.94
20	0.097	0.354	0.057	0.317	0.389	0.020	0.120	0.0	0.0	0.84	25.00	0.140	0.030	5.50	15.92
21	0.097	0.354	0.057	0.317	0.554	0.020	0.120	0.0	0.0	0.84	25.00	0.140	0.030	5.50	10.64
22	0.097	0.354	0.057	0.317	0.353	0.020	0.120	0.0	0.0	0.84	25.00	0.140	0.030	5.50	15.57
23	0.097	0.354	0.057	0.317	0.290	0.020	0.120	0.0	0.0	0.84	75.00	0.140	0.030	8.00	17.14
24	0.097	0.354	0.057	0.317	0.239	0.020	0.120	0.0	0.0	0.84	75.00	0.140	0.030	8.00	19.22
25	0.097	0.354	0.057	0.317	0.228	0.020	0.120	0.0	0.0	0.84	75.00	0.140	0.030	8.00	19.21
26	0.097	0.071	0.057	0.317	0.291	0.050	0.120	0.0	0.0	1.41	75.00	0.140	0.030	8.00	11.41
27	0.097	0.071	0.057	0.317	0.413	0.050	0.120	0.0	0.0	1.41	75.00	0.140	0.030	8.00	9.99
28	0.097	0.071	0.057	0.317	0.532	0.050	0.120	0.0	0.0	1.41	75.00	0.140	0.030	8.00	8.82
29	0.097	0.071	0.057	0.317	0.563	0.050	0.120	0.0	0.0	1.41	75.00	0.140	0.030	8.00	8.23
30	0.097	0.071	0.057	0.317	0.654	0.050	0.120	0.0	0.0	1.41	75.00	0.140	0.030	8.00	5.76
31	0.097	0.354	0.057	0.317	0.257	0.020	0.120	0.0	0.0	0.84	75.00	0.140	0.030	8.00	17.71
32	0.097	0.354	0.057	0.317	0.289	0.020	0.120	0.0	0.0	1.41	75.00	0.140	0.030	8.00	16.80
33	0.097	0.354	0.057	0.317	0.256	0.020	0.120	0.0	0.0	1.41	125.00	0.140	0.030	10.00	18.13
34	0.097	0.354	0.057	0.317	0.212	0.020	0.120	0.0	0.0	1.41	125.00	0.140	0.030	10.00	19.87

35	0.097	0.354	0.057	0.317	0.264	0.020	0.120	0.0	0.0	1.41	125.00	0.140	0.030	10.00	13.41
36	0.097	0.354	0.057	0.317	0.204	0.020	0.120	0.0	0.0	1.41	125.00	0.140	0.030	10.00	21.10
37	0.097	0.354	0.057	0.317	0.776	0.020	0.120	0.0	0.0	1.41	125.00	0.140	0.030	10.00	7.52
38	0.097	0.354	0.057	0.317	0.258	0.020	0.120	0.0	0.0	2.25	125.00	0.140	0.030	10.00	17.23
39	0.097	0.354	0.057	0.317	0.548	0.020	0.120	0.0	0.0	2.25	125.00	0.140	0.030	10.00	9.24
40	0.097	0.071	0.057	0.317	0.904	0.050	0.120	0.0	0.0	1.41	125.00	0.140	0.030	10.00	6.00
41	0.097	0.106	0.057	0.317	0.439	0.020	0.150	0.0	0.0	2.25	125.00	0.140	0.030	10.00	10.50
42	0.097	0.354	0.057	0.317	0.208	0.020	0.120	0.0	0.0	2.25	125.00	0.140	0.030	10.00	20.19
43	0.097	0.106	0.057	0.317	0.206	0.070	0.150	0.0	0.0	2.25	125.00	0.140	0.030	10.00	20.10
44	0.097	0.106	0.057	0.317	0.180	0.070	0.150	0.0	0.0	2.25	50.00	0.140	0.030	10.00	21.61
45	0.097	0.071	0.057	0.317	0.206	0.050	0.120	0.0	0.0	1.41	50.00	0.140	0.030	10.00	14.28
46	0.097	0.071	0.057	0.317	0.156	0.050	0.120	0.0	0.0	1.41	50.00	0.140	0.030	10.00	15.06
47	0.097	0.071	0.057	0.317	0.172	0.050	0.120	0.0	0.0	1.41	50.00	0.140	0.030	10.00	13.24
48	0.097	0.106	0.057	0.317	0.172	0.070	0.150	0.0	0.0	2.25	50.00	0.140	0.030	10.00	22.64
49	0.097	0.106	0.057	0.317	0.150	0.070	0.150	0.0	0.0	3.80	50.00	0.140	0.030	10.00	25.19
50	0.097	0.071	0.057	0.317	0.197	0.050	0.120	0.0	0.0	1.41	50.00	0.140	0.030	10.00	12.69
51	0.097	0.035	0.057	0.317	0.126	0.070	0.150	0.0	0.0	3.80	12.50	0.140	0.030	10.00	27.24
52	0.097	0.035	0.057	0.317	0.142	0.070	0.150	0.0	0.0	3.80	12.50	0.140	0.030	10.00	23.42
53	0.097	0.035	0.057	0.317	0.290	0.070	0.150	0.0	0.0	3.80	12.50	0.140	0.030	10.00	12.18
54	0.097	0.071	0.057	0.317	0.568	0.050	0.120	0.0	0.0	1.41	12.50	0.140	0.030	10.00	6.97
55	0.097	0.035	0.057	0.317	0.176	0.070	0.150	0.0	0.0	3.80	12.50	0.140	0.030	10.00	19.90
56	0.097	0.035	0.057	0.317	0.188	0.070	0.150	0.0	0.0	3.80	12.50	0.140	0.030	10.00	20.49
57	0.097	0.071	0.057	0.317	0.155	0.050	0.120	0.0	0.0	1.41	12.50	0.140	0.030	10.00	11.51
58	0.097	0.354	0.057	0.317	0.175	0.070	0.150	0.0	0.0	1.41	12.50	0.140	0.030	10.00	21.29
59	0.097	0.354	0.057	0.317	0.181	0.070	0.150	0.0	0.0	1.41	12.50	0.140	0.030	8.00	20.44
60	0.097	0.354	0.057	0.248	0.217	0.020	0.070	0.0	0.0	0.70	12.50	0.140	0.030	8.00	17.87
61	0.097	0.071	0.057	0.317	0.147	0.050	0.120	0.0	0.0	1.41	12.50	0.140	0.030	8.00	13.77
62	0.097	0.354	0.057	0.248	0.207	0.020	0.070	0.0	0.0	0.70	12.50	0.140	0.030	8.00	17.81
63	0.097	0.354	0.057	0.248	0.181	0.020	0.070	0.0	0.0	0.70	12.50	0.140	0.030	8.00	19.48
64	0.097	0.354	0.057	0.248	0.155	0.020	0.070	0.0	0.0	0.70	12.50	0.140	0.030	8.00	21.29
65	0.097	0.071	0.057	0.317	0.124	0.050	0.120	0.0	0.0	1.41	12.50	0.140	0.030	8.00	13.86
66	0.097	0.354	0.057	0.248	0.134	0.020	0.070	0.0	0.0	0.70	12.50	0.140	0.030	8.00	22.27
67	0.097	0.354	0.057	0.248	0.152	0.020	0.070	0.0	0.0	0.70	12.50	0.140	0.030	8.00	16.71
68	0.097	0.106	0.057	0.248	0.128	0.020	0.070	0.0	0.0	0.70	12.50	0.140	0.030	8.00	22.33
69	0.097	0.106	0.057	0.248	0.117	0.020	0.070	0.0	0.0	1.41	12.50	0.140	0.030	9.00	23.81
70	0.097	0.106	0.057	0.248	0.118	0.020	0.070	0.0	0.0	1.41	12.50	0.140	0.030	9.00	22.42
71	0.097	0.106	0.057	0.248	0.144	0.020	0.070	0.0	0.0	1.41	12.50	0.140	0.030	9.00	19.10
72	0.097	0.106	0.057	0.248	0.182	0.020	0.070	0.0	0.0	1.41	12.50	0.140	0.030	9.00	15.42
73	0.097	0.071	0.057	0.317	0.145	0.050	0.120	0.0	0.0	1.41	12.50	0.140	0.030	9.00	11.48
74	0.097	0.071	0.057	0.248	0.181	0.020	0.070	0.0	0.0	3.52	12.50	0.140	0.030	9.00	14.59
75	0.097	0.071	0.057	0.248	0.254	0.070	0.070	0.0	0.0	3.52	12.50	0.140	0.030	9.00	13.12
76	0.097	0.071	0.057	0.248	0.376	0.070	0.070	0.0	0.0	3.52	12.50	0.140	0.030	9.00	11.20

TEMPERATURE CORRECTION FACTORS , THETA

1.047	1.085	1.160	1.047	1.025	1.000	1.000	1.000	1.000	1.050	1.000	1.085	1.085	1.000	1.000

SECTION 2.3 SPECIFY WASTEWATER AND TRIBUTARY LOADS

SUMMARY OF POINT SOURCE INPUTS

SIMULATION PERIOD : AUGUST 1 - 15 , 1975

CONSTITUENT 1 IS NORG (MG/L)

CONSTITUENT 2 IS NH3 (MG/L)

CONSTITUENT 3 IS NO3 (MG/L)

CONSTITUENT 4 IS CBOD (MG/L)

CONSTITUENT 5 IS DO (MG/L)

MUNICIPAL AND INDUSTRIAL WASTEWATER AND TRIBUTARY INFLOW BY NODE

INPUT NODE	NAME OF DISCHARGE	TYPE OF DISCHARGE	******* FLOW ******* MGD	CFS	UNADJUSTED CONC (MG/L) + ADJ. FACTORS CONST1	CONST2	CONST3	CONST4	CONST5	ADJUSTED INPUT LOADS - 1000 LB/DAY CONST1	CONST2	CONST3	CONST4	CONST5
14	SALEMCTY	MUN	-2.80		2.10	8.50	0.0	48.00	5.30					
				-4.34	1.00	1.00	1.00	1.45	1.00	0.05	0.20	0.0	1.63	0.12
	NODE TOTAL			-4.34						0.05	0.20	0.0	1.63	0.12
17	SALEM	TRIB	-2.39		0.0	0.0	0.0	5.50	0.0					
				-3.70	1.00	1.00	1.00	1.45	1.00	0.0	0.0	0.0	0.16	0.0
	NODE TOTAL			-3.70						0.0	0.0	0.0	0.16	0.0
21	GETTYOIL	IND	-9.00		42.52	86.12	8.10	16.30	1.20					
				-13.95	1.00	1.00	1.00	1.90	1.00	3.19	6.47	0.61	2.33	0.09
	NODE TOTAL			-13.95						3.19	6.47	0.61	2.33	0.09
22	AMOCO	IND	-0.60		1.00	17.00	0.0	134.20	0.0					
				-0.93	1.00	1.00	1.00	1.90	1.00	0.01	0.09	0.0	1.28	0.0
	NODE TOTAL			-0.93						0.01	0.09	0.0	1.28	0.0

23	PENNSVLE	MUN	-0.90		12.00	29.00	0.0	129.70	0.0						
				-1.39	1.00	1.00	1.00	1.45	1.00	0.09	0.22	0.0	1.41	0.0
	NODE TOTAL			-1.39						0.09	0.22	0.0	1.41	0.0
24	DPCHAMBR	IND	-93.40		3.50	12.70	23.25	77.60	6.00					
				-144.77	1.00	1.00	1.00	1.45	1.00	2.73	9.90	18.13	87.72	4.68
24	ICI 1	IND	-2.20		1.83	1.44	4.52	104.80	4.50					
				-3.41	1.00	1.00	1.00	1.45	1.00	0.03	0.03	0.08	2.79	0.08
24	ICI 3	IND	-1.30		1.17	0.16	2.15	88.00	5.10					
				-2.01	1.00	1.00	1.00	1.45	1.00	0.01	0.00	0.02	1.38	0.06
24	ICI 4	IND	-0.40		0.56	0.27	1.39	58.20	5.90					
				-0.62	1.00	1.00	1.00	1.45	1.00	0.00	0.00	0.00	0.28	0.02
24	ICI 7	IND	-1.00		16.82	83.18	100.00	789.00	0.0					
				-1.55	1.00	1.00	1.00	1.45	1.00	0.14	0.69	0.83	9.55	0.0
	NODE TOTAL			-152.36						2.92	10.62	19.07	101.72	4.84
25	UPENSNCK	MUN	-0.50		0.0	0.0	0.0	128.10	0.0					
				-0.77	1.00	1.00	1.00	1.45	1.00	0.0	0.0	0.0	0.78	0.0
25	WLMINGTN	MUN	-60.50		6.60	8.90	0.90	44.30	5.20					
				-93.77	1.00	1.00	1.00	1.45	1.00	3.33	4.49	0.45	32.44	2.63
	NODE TOTAL			-94.55						3.33	4.49	0.45	33.21	2.63
29	CHRISTNA	TRIB	-148.39		1.00	0.23	1.52	4.50	4.00					
				-230.00	1.00	1.00	1.00	1.45	1.00	1.24	0.28	1.88	8.08	4.95
	NODE TOTAL			-230.00						1.24	0.28	1.88	8.08	4.95
30	BRANDYWN	TRIB	-304.97		0.84	0.06	2.09	9.60	8.20					
				-472.70	1.00	1.00	1.00	1.45	1.00	2.14	0.15	5.32	35.43	20.87
	NODE TOTAL			-472.70						2.14	0.15	5.32	35.43	20.87
31	PENSGROV	MUN	-0.30		0.0	0.0	0.0	25.60	0.0					
				-0.46	1.00	1.00	1.00	1.45	1.00	0.0	0.0	0.0	0.09	0.0
31	DPEDGMUR	IND	-11.60		2.06	0.41	1.65	4.30	0.0					
				-17.98	1.00	1.00	1.00	1.90	1.00	0.20	0.04	0.16	0.79	0.0
	NODE TOTAL			-18.44						0.20	0.04	0.16	0.88	0.0
33	OLDMANS	TRIB	-31.16		1.00	0.14	1.24	3.40	5.00					
				-48.30	1.00	1.00	1.00	1.45	1.00	0.26	0.04	0.32	1.28	1.30
33	ALLDCHEM	IND	-25.80		1.89	4.64	4.18	15.00	0.60					
				-39.99	1.00	1.00	1.00	1.90	1.00	0.41	1.00	0.90	6.14	0.13
33	PHOENIX	IND	-11.00		1.09	2.51	1.97	3.80	0.0					
				-17.05	1.00	1.00	1.00	1.90	1.00	0.10	0.23	0.18	0.66	0.0

	NODE TOTAL			-105.34						0.77	1.27	1.40	8.08	1.43
34	CHESTER	MUN	-9.20		0.0	7.96	1.72	84.20	5.40					
				-14.26	1.00	1.00	1.00	1.45	1.00	0.0	0.61	0.13	9.38	0.41
34	MARCUSHK	MUN	-0.60		22.97	15.98	2.00	137.70	0.0					
				-0.93	1.00	1.00	1.00	1.45	1.00	0.12	0.08	0.01	1.00	0.0
34	BP 201	IND	-2.40		0.0	1.12	0.90	36.50	2.40					
				-3.72	1.00	1.00	1.00	1.90	1.00	0.0	0.02	0.02	1.39	0.05
34	BP 101	IND	-77.00		0.0	0.20	2.02	11.20	6.90					
				-119.35	1.00	1.00	1.00	1.90	1.00	0.0	0.13	1.30	13.68	4.43
34	BP 002	IND	-39.00		0.0	0.16	1.96	11.70	5.00					
				-60.45	1.00	1.00	1.00	1.90	1.00	0.0	0.05	0.64	7.24	1.63
34	FMC	IND	-3.20		0.74	0.74	3.71	140.00	0.0					
				-4.96	1.00	1.00	1.00	1.45	1.00	0.02	0.02	0.10	5.42	0.0
34	MONSANTO	IND	-1.40		18.57	1.86	0.0	3586.00	0.0					
				-2.17	1.00	1.00	1.00	1.90	1.00	0.22	0.02	0.0	79.62	0.0
34	SUNOIL 1	IND	-88.30		11.00	2.34	2.24	30.00	5.00					
				-136.86	1.00	1.00	1.00	1.90	1.00	8.11	1.72	1.65	42.01	3.69
	NODE TOTAL			-342.70						8.46	2.66	3.85	159.73	10.21
36	CHESTER	TRIB	-53.03		1.07	0.50	2.59	2.30	7.40					
				-82.20	1.00	1.00	1.00	1.45	1.00	0.47	0.22	1.15	1.48	3.28
36	SCOTT 2	IND	-4.60		0.0	0.0	1.81	91.00	7.10					
				-7.13	1.00	1.00	1.00	1.90	1.00	0.0	0.0	0.07	6.64	0.27
36	SCOTT 3	IND	-8.30		0.0	0.0	1.88	88.00	6.70					
				-12.86	1.00	1.00	1.00	1.90	1.00	0.0	0.0	0.13	11.58	0.60
36	SCOTT 4	IND	-3.50		0.0	0.0	1.81	83.00	6.80					
				-5.42	1.00	1.00	1.00	1.90	1.00	0.0	0.0	0.05	4.61	0.20
	NODE TOTAL			-107.62						0.47	0.22	1.40	24.30	4.35
38	RIDLEY	TRIB	-6.50		1.07	0.50	2.59	2.30	7.40					
				-10.20	1.00	1.00	1.00	1.45	1.00	0.06	0.03	0.14	0.18	0.41
	NODE TOTAL			-10.20						0.06	0.03	0.14	0.18	0.41
39	UCARBIDE	IND	-2.60		1.90	13.91	3.90	22.40	2.50					
				-4.03	1.00	1.00	1.00	1.90	1.00	0.04	0.30	0.08	0.92	0.05
	NODE TOTAL			-4.03						0.04	0.30	0.08	0.92	0.05
40	DARBY	TRIB	-38.32		1.52	0.80	2.00	2.40	5.20					
				-59.40	1.00	1.00	1.00	1.45	1.00	0.49	0.26	0.64	1.11	1.66
40	CDCA	MUN	-9.70		7.30	13.93	1.01	37.50	6.90					
				-15.03	1.00	1.00	1.00	1.45	1.00	0.59	1.13	0.08	4.40	0.56
40	DRBYCRSA	MUN	-17.30		0.98	10.12	1.76	6.50	7.00					
				-26.81	1.00	1.00	1.00	1.45	1.00	0.14	1.46	0.25	1.36	1.01
40	MUKNPATS	MUN	-5.70		0.0	0.0	0.0	0.0	0.0					
				-8.83	1.00	1.00	1.00	1.45	1.00	0.0	0.0	0.0	0.0	0.0

40	TINICUM	MUN	0.0		0.0	0.0	0.0	0.0	0.0	0.0					
				0.0	1.00	1.00	1.00	1.45	1.00	0.0	0.0	0.0	0.0	0.0
	NODE TOTAL			-110.08						1.22	2.85	0.98	6.88	3.23
42	DPRPAUNO	IND	-14.20		1.10	37.10	15.20	10.80	0.0					
42	HERCULES	IND	-0.60	-22.01	1.00	1.00	1.00	1.90	1.00	0.13	4.40	1.80	2.43	0.0
					0.0	0.0	0.0	5.10	0.0					
	NODE TOTAL			-0.93	1.00	1.00	1.00	1.90	1.00	0.0	0.0	0.0	0.05	0.0
				-22.94						0.13	4.40	1.80	2.48	0.0
43	GLOSTRCO	MUN	-6.50		0.0	3.71	3.71	3.80	0.0					
43	PAULSBRO	MUN	-1.30	-10.07	1.00	1.00	1.00	1.45	1.00	0.0	0.20	0.20	0.30	0.0
43	MOBILCP1	IND	-7.20		0.0	26.93	0.0	64.00	0.0					
43	MOBILNY2	IND	-4.70	-2.01	1.00	1.00	1.00	1.45	1.00	0.0	0.29	0.0	1.01	0.0
43	MOBILIW3	IND	-4.30	-11.16	2.90	4.30	0.90	37.40	1.40					
43	SHELL	IND	-1.90	-7.28	1.00	1.00	1.00	1.90	1.00	0.17	0.26	0.05	4.27	0.08
43	OLINCHEM	IND	-17.40	-6.66	1.25	2.50	10.15	14.70	3.80					
43	MANTUA	TRIB	-7.10	-2.94	1.00	1.00	1.00	1.90	1.00	0.05	0.10	0.40	1.10	0.15
				-26.97	0.0	29.00	0.0	76.00	0.0					
				-11.00	1.00	1.00	1.00	1.90	1.00	0.0	1.04	0.0	5.18	0.0
					19.19	3.71	0.0	29.30	0.0					
					1.00	1.00	1.00	1.90	1.00	0.30	0.06	0.0	0.88	0.0
					0.0	2.06	0.0	3.30	0.0					
					1.00	1.00	1.00	1.90	1.00	0.0	0.30	0.0	0.91	0.0
					0.0	5.06	0.68	4.70	0.0					
					1.00	1.00	1.00	1.45	1.00	0.0	0.30	0.04	0.40	0.0
	NODE TOTAL			-78.11						0.53	2.55	0.69	14.05	0.23
44	PHILA SW	MUN	-173.00		8.30	1.80	0.25	50.00	0.0					
44	WOODBURY	MUN	-1.90	-268.15	1.00	1.00	1.00	1.45	1.00	11.99	2.60	0.36	104.69	0.0
44	NAT PARK	MUN	-0.60		0.0	1.24	0.0	85.40	0.0					
				-2.94	1.00	1.00	1.00	1.45	1.00	0.0	0.02	0.0	1.96	0.0
					0.0	3.71	0.0	64.00	0.0					
				-0.93	1.00	1.00	1.00	1.45	1.00	0.0	0.02	0.0	0.46	0.0
	NODE TOTAL			-272.02						11.99	2.64	0.36	107.12	0.0
45	GULF OIL	IND	-10.40		0.0	2.49	1.51	4.10	6.20					
45	ARCO SPL	IND	-2.70	-16.12	1.00	1.00	1.00	1.90	1.00	0.0	0.22	0.13	0.68	0.54
45	ARCO NYD	IND	-1.40		0.0	34.44	0.0	34.60	7.70					
45	ARCO WPL	IND	-0.10	-4.18	1.00	1.00	1.00	1.90	1.00	0.0	0.78	0.0	1.48	0.17
					0.0	0.32	1.15	40.00	2.30					
				-2.17	1.00	1.00	1.00	1.90	1.00	0.0	0.00	0.01	0.89	0.03
					0.0	3.97	0.49	5.50	4.70					
				-0.15	1.00	1.00	1.00	1.90	1.00	0.0	0.00	0.00	0.01	0.00
	NODE TOTAL			-22.63						0.0	1.00	0.14	3.05	0.74

47	SCHUYLKL	TRIB	-1329.03		0.60	0.08	1.98	3.40	6.20					
				-2060.00	1.00	1.00	1.00	1.45	1.00	6.66	0.89	21.96	54.69	68.78
	NODE TOTAL			-2060.00						6.66	0.89	21.96	54.69	68.78
48	GLOSTRCY	MUN	-2.50		2.90	15.90	2.07	18.60	0.0					
				-3.87	1.00	1.00	1.00	1.45	1.00	0.06	0.33	0.04	0.56	0.0
48	BELLMAWR	MUN	0.0		0.0	0.0	0.0	0.0	0.0					
				0.0	1.00	1.00	1.00	1.45	1.00	0.0	0.0	0.0	0.0	0.0
48	BROKLAWN	MUN	0.0		0.0	0.0	0.0	0.0	0.0					
				0.0	1.00	1.00	1.00	1.45	1.00	0.0	0.0	0.0	0.0	0.0
48	MTEPHRAM	MUN	0.0		0.0	0.0	0.0	0.0	0.0					
				0.0	1.00	1.00	1.00	1.45	1.00	0.0	0.0	0.0	0.0	0.0
48	NJ ZINC	IND	-11.60		2.27	11.76	1.44	32.60	0.0					
				-17.98	1.00	1.00	1.00	1.90	1.00	0.22	1.14	0.14	6.00	0.0
48	TEXACO	IND	-4.50		1.59	10.08	0.80	76.80	0.0					
				-6.97	1.00	1.00	1.00	1.90	1.00	0.06	0.38	0.03	5.48	0.0
48	BIGTIMBR	TRIB	-3.87		4.20	1.05	1.30	1.70	2.70					
				-6.00	1.00	1.00	1.00	1.45	1.00	0.14	0.03	0.04	0.08	0.09
	NODE TOTAL			-34.83						0.48	1.88	0.25	12.12	0.09
49	PHILA SE	MUN	-125.00		7.27	1.58	0.55	120.00	0.0					
				-193.75	1.00	1.00	1.00	1.45	1.00	7.59	1.65	0.57	181.54	0.0
49	CAMDEN M	MUN	-21.90		15.84	7.05	0.0	226.00	0.0					
				-33.94	1.00	1.00	1.00	1.45	1.00	2.90	1.29	0.0	59.90	0.0
49	MCAND&FB	IND	-1.30		0.0	0.0	0.0	256.10	0.0					
				-2.01	1.00	1.00	1.00	1.45	1.00	0.0	0.0	0.0	4.03	0.0
49	HARSHOW	IND	-0.60		0.0	0.0	0.0	128.10	0.0					
				-0.93	1.00	1.00	1.00	1.45	1.00	0.0	0.0	0.0	0.93	0.0
49	GAF	IND	-11.00		1.86	0.0	0.0	23.00	0.0					
				-17.05	1.00	1.00	1.00	1.90	1.00	0.17	0.0	0.0	4.01	0.0
	NODE TOTAL			-247.69						10.65	2.94	0.57	250.41	0.0
50	NEWTON	TRIB	-3.87		4.20	1.05	1.30	1.70	2.70					
				-6.00	1.00	1.00	1.00	1.45	1.00	0.14	0.03	0.04	0.08	0.09
	NODE TOTAL			-6.00						0.14	0.03	0.04	0.08	0.09
51	AMSTAR 1	IND	-23.60		0.0	0.33	1.67	5.00	6.30					
				-36.58	1.00	1.00	1.00	1.45	1.00	0.0	0.07	0.33	1.43	1.24
51	AMSTAR 3	IND	-2.00		0.0	0.37	1.74	6.20	5.40					
				-3.10	1.00	1.00	1.00	1.45	1.00	0.0	0.01	0.03	0.15	0.09
	NODE TOTAL			-39.68						0.0	0.07	0.36	1.58	1.33
52	NATSUGAR	IND	-15.70		0.0	0.18	1.27	8.60	7.50					
				-24.33	1.00	1.00	1.00	1.45	1.00	0.0	0.02	0.17	1.63	0.98
	NODE TOTAL			-24.33						0.0	0.02	0.17	1.63	0.98

54	CAMDEN N	MUN	-3.90		6.19	23.52	15.17	92.00	0.0						
				-6.04	1.00	1.00	1.00	1.45	1.00	0.20	0.77	0.49	4.34	0.0
54	COOPER	TRIB	-43.87		0.60	1.76	1.00	5.50	6.70					
				-68.00	1.00	1.00	1.00	1.45	1.00	0.22	0.64	0.37	2.92	2.45
	NODE TOTAL			-74.04						0.42	1.41	0.86	7.26	2.45
55	PHILA NE	MUN	-199.00		11.60	5.20	0.17	51.00	2.00					
				-308.45	1.00	1.00	1.00	1.45	1.00	19.27	8.64	0.28	122.83	3.32
55	PENSAUKN	MUN	-3.60		6.17	18.50	4.50	69.30	0.0					
				-5.58	1.00	1.00	1.00	1.45	1.00	0.19	0.56	0.14	3.02	0.0
55	GEORGPAC	IND	-1.90		1.30	2.30	0.90	222.00	0.0					
				-2.94	1.00	1.00	1.00	1.45	1.00	0.02	0.04	0.01	5.10	0.0
	NODE TOTAL			-316.97						19.47	9.23	0.43	130.96	3.32
56	FRANKFRT	TRIB	-6.45		1.00	1.32	2.00	6.90	3.40					
				-10.00	1.00	1.00	1.00	1.45	1.00	0.05	0.07	0.11	0.54	0.18
	NODE TOTAL			-10.00						0.05	0.07	0.11	0.54	0.18
57	MTLAUREL	MUN	0.0		0.0	0.0	0.0	0.0	0.0					
				0.0	1.00	1.00	1.00	1.45	1.00	0.0	0.0	0.0	0.0	0.0
57	PENSAUKN	TRIB	-8.77		1.00	1.32	2.00	6.90	3.40					
				-13.60	1.00	1.00	1.00	1.45	1.00	0.07	0.10	0.15	0.73	0.25
	NODE TOTAL			-13.60						0.07	0.10	0.15	0.73	0.25
58	PALMYRA	MUN	-0.40		4.90	32.40	3.50	47.60	3.50					
				-0.62	1.00	1.00	1.00	1.45	1.00	0.02	0.11	0.01	0.23	0.01
	NODE TOTAL			-0.62						0.02	0.11	0.01	0.23	0.01
59	CINAMNSN	MUN	-1.60		4.60	22.00	0.0	30.00	5.00					
				-2.48	1.00	1.00	1.00	1.45	1.00	0.06	0.29	0.0	0.58	0.07
59	PENYPACK	TRIB	-3.23		1.00	0.10	3.20	1.00	10.40					
				-5.00	1.00	1.00	1.00	1.45	1.00	0.03	0.00	0.09	0.04	0.28
	NODE TOTAL			-7.48						0.09	0.30	0.09	0.62	0.35
60	POQUESNG	TRIB	-3.23		1.00	0.10	3.20	1.00	10.40					
				-5.00	1.00	1.00	1.00	1.45	1.00	0.03	0.00	0.09	0.04	0.28
	NODE TOTAL			-5.00						0.03	0.00	0.09	0.04	0.28
61	WLINGBRO	MUN	-1.90		1.24	0.0	0.0	38.40	0.0					

61	RANCOCAS	TRIB	-112.90	-2.94	1.00	1.00	1.00	1.45	1.00	0.02	0.0	0.0	0.88	0.0
					1.33	0.14	1.24	3.80	4.90					
				-175.00	1.00	1.00	1.00	1.45	1.00	1.25	0.13	1.17	5.19	4.62
	NODE TOTAL			-177.94						1.27	0.13	1.17	6.08	4.62
64	BRLINGTN	MUN	0.0		0.0	0.0	0.0	0.0	0.0					
				0.0	1.00	1.00	1.00	1.45	1.00	0.0	0.0	0.0	0.0	0.0
64	TENNECO	IND	-1.30		6.00	18.00	3.10	34.50	3.30					
				-2.01	1.00	1.00	1.00	1.45	1.00	0.07	0.20	0.03	0.54	0.04
	NODE TOTAL			-2.01						0.07	0.20	0.03	0.54	0.04
65	FALLSTWP	MUN	-2.60		14.39	2.32	11.14	9.60	0.0					
				-4.03	1.00	1.00	1.00	1.45	1.00	0.31	0.05	0.24	0.30	0.0
65	NESHAMNY	TRIB	-100.26		1.04	0.12	3.00	1.70	8.30					
				-155.40	1.00	1.00	1.00	1.45	1.00	0.87	0.10	2.51	2.06	6.95
	NODE TOTAL			-159.43						1.18	0.15	2.75	2.36	6.95
66	BRSTLBRO	MUN	-2.10		21.37	6.49	4.60	13.00	6.30					
				-3.25	1.00	1.00	1.00	1.45	1.00	0.37	0.11	0.08	0.33	0.11
66	BRSTLTWP	MUN	-2.30		3.71	0.0	1.39	3.20	0.0					
				-3.56	1.00	1.00	1.00	1.45	1.00	0.07	0.0	0.03	0.09	0.0
66	ROHM&HAS	IND	-1.20		0.98	0.49	0.10	30.00	1.70					
				-1.86	1.00	1.00	1.00	1.45	1.00	0.01	0.00	0.00	0.44	0.02
66	OTR&ASNK	TRIB	-6.45		0.0	0.0	0.0	12.30	0.0					
				-10.00	1.00	1.00	1.00	1.45	1.00	0.0	0.0	0.0	0.96	0.0
	NODE TOTAL			-18.68						0.46	0.12	0.11	1.82	0.13
69	LWRBUCKS	MUN	-8.50		9.29	49.52	0.62	42.70	5.00					
				-13.17	1.00	1.00	1.00	1.45	1.00	0.66	3.51	0.04	4.39	0.35
69	FLORENCE	MUN	-0.60		3.71	11.14	0.0	64.00	5.00					
				-0.93	1.00	1.00	1.00	1.45	1.00	0.02	0.06	0.0	0.46	0.03
69	PATPARCH	IND	-3.20		22.29	0.37	0.0	12.80	0.0					
				-4.96	1.00	1.00	1.00	1.45	1.00	0.60	0.01	0.0	0.50	0.0
69	MARTINS	TRIB	-5.48		0.0	0.0	0.0	3.60	0.0					
				-8.50	1.00	1.00	1.00	1.45	1.00	0.0	0.0	0.0	0.24	0.0
	NODE TOTAL			-27.56						1.27	3.58	0.04	5.59	0.38
71	USSTRMTP	IND	-32.30		1.74	2.44	1.90	3.40	5.00					
				-50.06	1.00	1.00	1.00	1.45	1.00	0.47	0.66	0.51	1.33	1.35
71	USSPODML	IND	0.0		0.0	0.0	0.0	0.0	0.0					
				0.0	1.00	1.00	1.00	0.0	1.00	0.0	0.0	0.0	0.0	0.0
	NODE TOTAL			-50.06						0.47	0.66	0.51	1.33	1.35

72	BORDENTN	MUN	-1.00		3.60	14.60	0.0	48.30	5.00						
				-1.55	1.00	1.00	1.00	1.45	1.00	0.03	0.12	0.0	0.58	0.04
	NODE TOTAL			-1.55						0.03	0.12	0.0	0.58	0.04
73	HAMILTON	MUN	-9.00		8.00	26.60	12.00	11.90	5.00					
				-13.95	1.00	1.00	1.00	1.45	1.00	0.60	2.00	0.90	1.30	0.38
73	CROSWICK	TRIB	-40.65		0.80	0.14	1.24	3.00	7.00					
				-63.00	1.00	1.00	1.00	1.45	1.00	0.27	0.05	0.42	1.48	2.37
	NODE TOTAL			-76.95						0.87	2.05	1.32	2.77	2.75
75	TRENTON	MUN	-19.30		0.90	14.90	0.76	40.00	1.60					
				-29.91	1.00	1.00	1.00	1.45	1.00	0.14	2.40	0.12	9.34	0.26
	NODE TOTAL			-29.91						0.14	2.40	0.12	9.34	0.26
76	MORRISVL	MUN	-3.90		1.00	31.50	1.81	18.00	7.40					
				-6.04	1.00	1.00	1.00	1.45	1.00	0.03	1.03	0.06	0.85	0.24
76	ASSNPINK	TRIB	-65.81		0.80	0.67	2.40	3.00	7.20					
				-102.00	1.00	1.00	1.00	1.45	1.00	0.44	0.37	1.32	2.39	3.95
	NODE TOTAL			-108.04						0.47	1.39	1.38	3.24	4.20

SUMMARY OF DISCHARGE LOADS BY ZONE AND TYPE

	INPUT ZONE	TYPE OF DISCHARGE	NUMBER OF DISCHARGES	ADJUSTED INPUT LOADS - 1000 LB/DAY CONST1	CONST2	CONST3	CONST4	CONST5	INPUT LOADS - PERCENT OF ZONE BY TYPE CONST1	CONST2	CONST3	CONST4	CONST5
	1	MUN	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1	IND	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1	TRIB	1	17.40	3.39	43.71	92.29	360.69	100.00	100.00	100.00	100.00	100.00
=		ZONE TOTAL	1	17.40	3.39	43.71	92.29	360.69	17.66	4.73	38.14	8.39	70.22
	2	MUN	12	2.33	9.57	1.48	19.12	1.47	36.60	86.29	19.39	55.70	6.91
	2	IND	5	1.14	0.87	0.55	2.80	1.40	17.93	7.82	7.18	8.17	6.57
	2	TRIB	8	2.89	0.65	5.59	12.40	18.45	45.46	5.89	73.43	36.13	86.52
-		ZONE TOTAL	25	6.35	11.09	7.61	34.32	21.33	6.45	15.47	6.64	3.12	4.15
	3	MUN	7	30.15	13.00	1.50	371.87	3.33	97.81	93.01	55.48	94.52	38.67
	3	IND	7	0.19	0.13	0.54	17.29	2.31	0.62	0.94	19.97	4.39	26.84
	3	TRIB	4	0.48	0.85	0.66	4.27	2.97	1.57	6.05	24.55	1.09	34.48
-		ZONE TOTAL	18	30.83	13.98	2.70	393.43	8.62	31.28	19.50	2.35	35.77	1.68
	4	MUN	15	12.89	6.74	1.08	125.12	1.98	42.94	34.74	3.42	32.46	2.25
	4	IND	23	9.32	10.94	6.61	202.46	11.90	31.05	56.37	20.87	52.51	13.51
	4	TRIB	6	7.81	1.73	23.98	57.94	74.21	26.01	8.89	75.71	15.03	84.24
-		ZONE TOTAL	44	30.03	19.41	31.67	385.53	88.09	30.47	27.07	27.64	35.06	17.15
	5	MUN	5	3.47	4.91	0.45	36.34	2.75	24.92	20.61	1.57	18.71	7.87
	5	IND	10	6.82	18.45	20.92	112.92	5.05	48.97	77.41	72.39	58.14	14.47
	5	TRIB	4	3.64	0.47	7.53	44.96	27.13	26.10	1.99	26.04	23.15	77.66
-		ZONE TOTAL	19	13.93	23.83	28.90	194.22	34.93	14.14	33.23	25.22	17.66	6.80
-		GRAND TOTAL	107	98.53	71.71	114.59	1099.78	513.66					

SECTION 2.4 SPECIFY WATER QUALITY BOUNDARY CONDITIONS

SEAWARD BOUNDARY CONDITIONS

NODE 1 : COURTHOUSE PT , MARYLAND

' CIN1 ' PERIOD = 2400 CYCLES

START CYCLE	DURATION (CYCLES)	CONST1 (MG/L)	CONST2 (MG/L)	CONST3 (MG/L)	CONST4 (MG/L)	CONST5 (MG/L)
1	2400	0.30	0.30	1.00	1.45	7.00

NODE 2 : LISTON PT , DELAWARE

' CINMAX ' PERIOD = 2400 CYCLES

START CYCLE	DURATION (CYCLES)	CONST1 (MG/L)	CONST2 (MG/L)	CONST3 (MG/L)	CONST4 (MG/L)	CONST5 (MG/L)
1	2400	0.32	0.12	1.40	2.17	5.50

UPSTREAM BOUNDARY CONDITIONS

NODE 76 RECEIVES VARYING LOADS FROM DELAWARE (RIVR)

DISCHARGE PERIOD = 3250 CYCLES

START CYCLE	DURATION (CYCLES)	FLOW (CFS)	CONST1 (MG/L)	CONST2 (MG/L)	CONST3 (MG/L)	CONST4 (MG/L)	CONST5 (MG/L)
1	850	-7880.00	0.41	0.08	1.03	2.17	8.50
851	2400	-7880.00	0.41	0.08	1.03	2.17	7.20

SECTION 2.5 PRINT HYDRAULIC INPUTS

JUNCTION HEAD AND HYD. RADIUS AND X-SECTIONAL AREA OF CHANNELS ARE AT MEAN TIDE **

CHANNEL DATA									JUNCTION DATA							
CHAN.	LENGTH	WIDTH	AREA	MANNING	NET FLOW	HYD. RADIUS	JUNC. AT ENDS		JUNC.	INFLOW	HEAD	CHANNELS ENTERING JUNCTION				
1	7000.	2400.	31042.	0.010	1539.43	12.9	1	3	1	0.0	0.10	1	0	0	0	0
2	11000.	850.	24479.	0.010	1539.41	28.8	3	4	2	0.0	-0.07	9	0	0	0	0
3	11000.	650.	18647.	0.010	1539.43	28.7	4	5	3	0.0	0.10	1	2	0	0	0
4	11000.	600.	17093.	0.010	1539.40	28.5	5	6	4	0.0	0.10	2	3	0	0	0
5	11000.	600.	16918.	0.010	1539.41	28.2	6	7	5	0.0	0.10	3	4	0	0	0
6	11000.	600.	13768.	0.010	1539.38	22.9	7	8	6	0.0	0.10	4	5	0	0	0
7	11000.	600.	12384.	0.010	1539.39	20.6	8	9	7	0.0	0.11	5	6	0	0	0
8	15679.	600.	11039.	0.010	1539.39	18.4	9	10	8	0.0	0.11	6	7	0	0	0
9	14994.	12995.	212742.	0.010	-13197.96	16.4	2	11	9	0.0	0.10	7	8	0	0	0
10	14994.	11829.	183011.	0.010	-13198.80	15.5	11	12	10	0.0	0.09	8	12	0	0	0
11	14994.	7700.	119235.	0.010	-16448.20	15.5	12	13	11	0.0	-0.03	9	10	0	0	0
12	11995.	4500.	78133.	0.010	1539.33	17.4	10	13	12	0.0	0.01	10	11	13	0	0
13	19326.	1700.	11956.	0.010	3249.09	7.0	12	14	13	0.0	0.09	11	12	14	18	20
14	7330.	7600.	68899.	0.010	5736.47	9.1	13	14	14	0.0	0.10	13	14	15	19	0
15	8996.	1000.	8622.	0.015	-16.39	8.6	14	15	15	0.0	0.19	15	16	0	0	0
16	8996.	4332.	32726.	0.015	-16.17	7.6	15	16	16	0.0	0.19	16	17	0	0	0
17	8996.	5331.	40389.	0.015	-15.61	7.6	16	17	17	-15.0	0.19	17	0	0	0	0
18	13661.	3800.	53787.	0.010	6690.48	14.2	13	18	18	0.0	0.11	18	21	0	0	0
19	8996.	5600.	23845.	0.010	9001.87	4.3	14	19	19	0.0	0.14	19	22	0	0	0
20	13661.	3400.	70398.	0.010	-27337.84	20.7	13	20	20	0.0	0.14	20	22	24	0	0
21	10662.	6000.	45839.	0.010	6690.38	7.6	18	21	21	0.0	0.21	21	23	0	0	0
22	9663.	4900.	48016.	0.010	9001.70	9.8	19	20	22	0.0	0.21	23	24	25	0	0
23	10996.	7600.	98327.	0.010	6690.25	12.9	21	22	23	0.0	0.24	25	26	0	0	0
24	13994.	3900.	66887.	0.010	-18336.19	17.2	20	22	24	0.0	0.25	26	27	0	0	0
25	13661.	8996.	149854.	0.010	-11646.09	16.7	22	23	25	0.0	0.26	27	28	33	0	0
26	11995.	8274.	146746.	0.010	-11646.25	17.7	23	24	26	0.0	0.27	28	29	32	0	0
27	11995.	6942.	145752.	0.010	-11646.41	21.0	24	25	27	0.0	0.27	29	30	0	0	0
28	9330.	1000.	14331.	0.015	-780.04	14.3	25	26	28	0.0	0.26	30	31	0	0	0
29	9330.	722.	7506.	0.015	-262.06	10.4	26	27	29	-262.0	0.26	31	0	0	0	0
30	9330.	389.	3595.	0.015	-262.07	9.2	27	28	30	-518.0	0.29	32	0	0	0	0
31	9330.	278.	2289.	0.015	-262.05	8.2	28	29	31	0.0	0.29	33	34	0	0	0
32	9330.	389.	2239.	0.015	-517.98	5.8	26	30	32	0.0	0.32	34	35	0	0	0
33	11995.	8163.	148160.	0.016	-10866.51	18.2	25	31	33	0.0	0.35	35	36	0	0	0
34	11995.	7441.	128240.	0.016	-10866.80	17.2	31	32	34	-49.0	0.37	36	37	38	0	0
35	11995.	6997.	114339.	0.016	-10866.88	16.3	32	33	35	0.0	0.38	38	40	0	0	0
36	13328.	5720.	114952.	0.016	-10867.02	20.1	33	34	36	-83.0	0.40	37	39	0	0	0
37	11995.	4054.	90971.	0.020	-11728.44	22.4	34	36	37	0.0	0.43	40	41	0	0	0
38	10662.	3887.	63885.	0.020	910.37	16.4	34	35	38	0.0	0.43	39	41	42	43	0
39	11995.	4332.	85987.	0.020	-11645.45	19.8	36	38	39	0.0	0.44	42	44	45	0	0
40	7330.	2443.	15694.	0.020	910.35	6.4	35	37	40	-60.0	0.41	44	0	0	0	0
41	7330.	2100.	18473.	0.020	910.36	8.8	37	38	41	0.0	0.48	45	46	0	0	0
42	6331.	2600.	29988.	0.020	-24.01	11.5	38	39	42	0.0	0.46	43	47	0	0	0
43	11995.	4942.	92486.	0.020	-10711.02	18.7	38	42	43	-24.0	0.48	46	47	48	0	0
44	8996.	300.	1799.	0.020	-60.01	6.0	39	40	44	0.0	0.50	48	49	52	0	0
45	6331.	1944.	13392.	0.020	36.03	6.9	39	41	45	0.0	0.51	49	50	0	0	0
46	11995.	2388.	28789.	0.020	36.07	12.1	41	43	46	0.0	0.52	50	51	0	0	0
47	11995.	3499.	77940.	0.020	-10710.95	22.3	42	43	47	-2067.0	0.52	51	0	0	0	0

48	14994.	3998.	89676.	0.020	-10650.69	22.4	43	44	48	0.0	0.51	52	53	0	0	0
49	10662.	750.	9224.	0.020	-2067.88	12.3	44	45	49	0.0	0.52	53	54	55	0	0
50	10662.	611.	10216.	0.020	-2067.64	16.7	45	46	50	0.0	0.52	54	0	0	0	0
51	10662.	555.	7346.	0.020	-2067.23	13.2	46	47	51	0.0	0.53	55	56	0	0	0
52	11995.	3887.	86115.	0.020	-8582.41	22.2	44	48	52	0.0	0.54	56	57	59	0	0
53	11995.	2832.	66008.	0.020	-8582.29	23.3	48	49	53	0.0	0.54	57	58	60	0	0
54	8996.	167.	2119.	0.020	0.01	12.7	49	50	54	-32.0	0.53	58	0	0	0	0
55	11995.	2332.	65651.	0.020	-8582.16	28.2	49	51	55	-255.0	0.55	59	60	61	0	0
56	10329.	2888.	76207.	0.020	-8582.17	26.4	51	52	56	0.0	0.56	61	62	63	0	0
57	6331.	1400.	19081.	0.020	-948.65	13.6	52	53	57	-14.0	0.56	62	0	0	0	0
58	8996.	300.	2091.	0.020	-31.97	7.0	53	54	58	0.0	0.59	63	64	0	0	0
59	11995.	3165.	74005.	0.020	-7633.55	23.4	52	55	59	0.0	0.61	64	65	0	0	0
60	7997.	2499.	30571.	0.020	-916.71	12.2	53	55	60	0.0	0.64	65	66	67	0	0
61	9674.	3195.	65797.	0.020	-8295.45	20.6	55	56	61	-175.0	0.64	66	0	0	0	0
62	9007.	300.	3453.	0.020	-13.98	11.5	56	57	62	0.0	0.67	67	68	0	0	0
63	9674.	2474.	52892.	0.035	-8281.66	21.4	56	58	63	0.0	0.69	68	69	0	0	0
64	9674.	2752.	58386.	0.035	-8281.88	21.2	58	59	64	0.0	0.71	69	70	71	0	0
65	9674.	2419.	47327.	0.035	-8282.13	19.6	59	60	65	-160.0	0.71	70	0	0	0	0
66	9007.	600.	8262.	0.035	-174.87	13.8	60	61	66	0.0	0.73	71	72	73	0	0
67	9007.	2863.	49229.	0.035	-8107.45	17.2	60	62	67	0.0	0.73	73	74	0	0	0
68	9007.	2391.	44320.	0.035	-8107.51	18.5	62	63	68	0.0	0.74	72	74	75	0	0
69	9508.	1890.	38949.	0.035	-8107.66	20.6	63	64	69	0.0	0.77	75	76	0	0	0
70	6331.	334.	4628.	0.035	-159.87	13.9	64	65	70	0.0	0.79	76	77	0	0	0
71	9508.	1640.	37847.	0.035	-7948.16	23.1	64	66	71	0.0	0.83	77	78	0	0	0
72	11009.	1307.	31421.	0.035	-6300.30	24.0	66	68	72	0.0	0.88	78	79	80	0	0
73	7839.	862.	14330.	0.040	-1648.29	16.6	66	67	73	-64.0	0.88	79	0	0	0	0
74	7839.	834.	14004.	0.040	-1648.41	16.8	67	68	74	0.0	0.92	80	81	0	0	0
75	9674.	1362.	31621.	0.040	-7948.96	23.2	68	69	75	0.0	0.98	81	82	0	0	0
76	10842.	1334.	32490.	0.040	-7948.75	24.4	69	70	76	-7880.0	1.18	82	0	0	0	0
77	12009.	1418.	29466.	0.040	-7948.03	20.8	70	71								
78	9007.	1362.	22853.	0.040	-7946.87	16.8	71	72								
79	6005.	334.	3833.	0.040	-64.13	11.5	72	73								
80	7506.	1473.	21551.	0.040	-7881.72	14.6	72	74								
81	8000.	1168.	16973.	0.040	-7880.84	14.5	74	75								
82	8000.	862.	9652.	0.040	-7880.27	11.2	75	76								

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SECTION 2.6 SPECIFY INITIAL WATER QUALITY CONDITIONS

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WATER QUALITY DATA

JUNC.	INFLOW	* FIRST CONSTITUENT * INITIAL CONC.	INFLOW LOAD.	* SECOND CONSTITUENT * INITIAL CONC.	INFLOW LOAD.	* THIRD CONSTITUENT * INITIAL CONC.	INFLOW LOAD	* FOURTH CONSTITUENT * INITIAL CONC.	INFLOW LOAD	* FIFTH CONSTITUENT * INITIAL CONC.	INFLOW LOAD
1	0.0	0.40	0.0	0.10	0.0	1.50	0.0	1.00	0.0	5.00	0.0
2	0.0	0.40	0.0	0.10	0.0	1.50	0.0	1.00	0.0	5.00	0.0
3	0.0	0.40	0.0	0.10	0.0	1.50	0.0	1.00	0.0	5.00	0.0
4	0.0	0.40	0.0	0.10	0.0	1.50	0.0	1.00	0.0	5.00	0.0
5	0.0	0.40	0.0	0.10	0.0	1.50	0.0	1.00	0.0	5.00	0.0
6	0.0	0.40	0.0	0.10	0.0	1.50	0.0	1.00	0.0	5.00	0.0
7	0.0	0.40	0.0	0.10	0.0	1.50	0.0	1.00	0.0	5.00	0.0
8	0.0	0.40	0.0	0.10	0.0	1.50	0.0	1.00	0.0	5.00	0.0
9	0.0	0.40	0.0	0.10	0.0	1.50	0.0	1.00	0.0	5.00	0.0
10	0.0	0.40	0.0	0.10	0.0	1.50	0.0	1.00	0.0	5.00	0.0
11	0.0	0.40	0.0	0.10	0.0	1.50	0.0	1.00	0.0	5.00	0.0
12	0.0	0.40	0.0	0.10	0.0	1.50	0.0	1.00	0.0	5.00	0.0
13	0.0	0.40	0.0	0.10	0.0	1.50	0.0	1.00	0.0	5.00	0.0
14	-4.3	0.40	0.05	0.10	0.20	1.50	0.0	1.00	1.63	5.00	0.12
15	0.0	0.40	0.0	0.10	0.0	1.50	0.0	1.00	0.0	5.00	0.0
16	0.0	0.40	0.0	0.10	0.0	1.50	0.0	1.00	0.0	5.00	0.0
17	-3.7	0.40	0.0	0.10	0.0	1.50	0.0	1.00	0.16	5.00	0.0
18	0.0	0.40	0.0	0.10	0.0	1.50	0.0	1.00	0.0	5.00	0.0
19	0.0	0.40	0.0	0.10	0.0	1.50	0.0	1.00	0.0	5.00	0.0
20	0.0	0.40	0.0	0.10	0.0	1.70	0.0	1.00	0.0	5.00	0.0
21	-13.9	0.40	3.19	0.10	6.47	1.70	0.61	1.00	2.33	5.00	0.09
22	-0.9	0.40	0.01	0.10	0.09	1.70	0.0	1.00	1.28	5.00	0.0
23	-1.4	0.40	0.09	0.10	0.22	1.70	0.0	1.00	1.41	5.00	0.0
24	-152.4	0.50	2.92	0.10	10.62	1.70	19.07	1.00	101.72	5.00	4.84
25	-94.5	0.50	3.33	0.10	4.49	1.70	0.45	1.00	33.21	5.00	2.63
26	0.0	0.50	0.0	0.10	0.0	1.70	0.0	1.00	0.0	5.00	0.0
27	0.0	0.50	0.0	0.10	0.0	1.70	0.0	1.00	0.0	5.00	0.0
28	0.0	0.50	0.0	0.10	0.0	1.70	0.0	1.00	0.0	5.00	0.0
29	-230.0	0.50	1.24	0.10	0.28	1.70	1.88	1.00	8.08	5.00	4.95
30	-472.7	0.50	2.14	0.10	0.15	1.70	5.32	1.00	35.43	5.00	20.87
31	-18.4	0.50	0.20	0.10	0.04	1.70	0.16	1.00	0.88	5.00	0.0
32	0.0	0.50	0.0	0.10	0.0	1.70	0.0	1.00	0.0	5.00	0.0
33	-105.3	0.50	0.77	0.10	1.27	1.40	1.40	1.00	8.08	5.00	1.43
34	-342.7	0.50	8.46	0.10	2.66	1.40	3.85	2.00	159.73	5.00	10.21
35	0.0	0.50	0.0	0.10	0.0	1.40	0.0	2.00	0.0	5.00	0.0
36	-107.6	0.50	0.47	0.30	0.22	1.40	1.40	2.00	24.30	5.00	4.35
37	0.0	0.50	0.0	0.30	0.0	1.40	0.0	2.00	0.0	5.00	0.0
38	-10.2	0.50	0.06	0.30	0.03	1.40	0.14	2.00	0.18	3.00	0.41
39	-4.0	0.50	0.04	0.30	0.30	1.40	0.08	2.00	0.92	3.00	0.05
40	-110.1	0.50	1.22	0.30	2.85	1.40	0.98	2.00	6.88	3.00	3.23
41	0.0	0.50	0.0	0.30	0.0	1.40	0.0	2.00	0.0	3.00	0.0
42	-22.9	0.50	0.13	0.30	4.40	1.40	1.80	2.00	2.48	3.00	0.0
43	-78.1	0.50	0.53	0.65	2.55	1.40	0.69	2.00	14.05	3.00	0.23

44	-272.0	0.50	11.99	0.65	2.64	1.20	0.36	3.00	107.12	1.50	0.0
45	-22.6	0.50	0.0	0.65	1.00	1.20	0.14	3.00	3.05	1.50	0.74
46	0.0	0.50	0.0	0.65	0.0	1.20	0.0	3.00	0.0	1.50	0.0
47	-2060.0	0.50	6.66	0.65	0.89	1.20	21.96	3.00	54.69	1.50	68.78
48	-34.8	0.50	0.48	0.65	1.88	1.20	0.25	3.00	12.12	1.50	0.09
49	-247.7	0.50	10.65	0.65	2.94	1.20	0.57	3.00	250.41	1.50	0.0
50	-6.0	0.50	0.14	0.65	0.03	1.20	0.04	3.00	0.08	1.50	0.09
51	-39.7	0.50	0.0	0.65	0.07	1.20	0.36	3.00	1.58	1.50	1.33
52	-24.3	0.50	0.0	0.65	0.02	1.20	0.17	1.50	1.63	1.50	0.98
53	0.0	0.50	0.0	0.65	0.0	1.20	0.0	1.50	0.0	1.50	0.0
54	-74.0	0.50	0.42	0.65	1.41	1.20	0.86	1.50	7.26	3.00	2.45
55	-317.0	0.50	19.47	0.40	9.23	1.20	0.43	1.50	130.96	3.00	3.32
56	-10.0	0.50	0.05	0.40	0.07	1.20	0.11	1.50	0.54	3.00	0.18
57	-13.6	0.50	0.07	0.40	0.10	1.20	0.15	1.00	0.73	3.00	0.25
58	-0.6	0.50	0.02	0.40	0.11	1.20	0.01	1.00	0.23	3.00	0.01
59	-7.5	0.40	0.09	0.20	0.30	1.20	0.09	1.00	0.62	5.50	0.35
60	-5.0	0.40	0.03	0.20	0.00	1.20	0.09	1.00	0.04	5.50	0.28
61	-177.9	0.40	1.27	0.20	0.13	1.20	1.17	1.00	6.08	5.50	4.62
62	0.0	0.40	0.0	0.20	0.0	1.20	0.0	1.00	0.0	5.50	0.0
63	0.0	0.40	0.0	0.20	0.0	1.20	0.0	1.00	0.0	5.50	0.0
64	-2.0	0.40	0.07	0.20	0.20	1.20	0.03	1.00	0.54	5.50	0.04
65	-159.4	0.40	1.18	0.20	0.15	1.20	2.75	2.00	2.36	5.50	6.95
66	-18.7	0.40	0.46	0.20	0.12	1.20	0.11	2.00	1.92	5.50	0.13
67	0.0	0.40	0.0	0.20	0.0	1.20	0.0	2.00	0.0	5.50	0.0
68	0.0	0.40	0.0	0.20	0.0	1.20	0.0	2.00	0.0	5.50	0.0
69	-27.6	0.40	1.27	0.20	3.58	1.20	0.04	2.00	5.59	5.50	0.38
70	0.0	0.40	0.0	0.20	0.0	1.20	0.0	2.00	0.0	7.50	0.0
71	-50.1	0.40	0.47	0.20	0.66	1.20	0.51	2.00	1.33	7.50	1.35
72	-1.5	0.40	0.03	0.20	0.12	1.20	0.0	2.00	0.58	7.50	0.04
73	-76.9	0.40	0.87	0.20	2.05	1.20	1.32	2.00	2.77	7.50	2.75
74	0.0	0.40	0.0	0.20	0.0	1.20	0.0	2.00	0.0	7.50	0.0
75	-29.9	0.40	0.14	0.20	2.40	1.20	0.12	2.00	9.34	7.50	0.26
76	-7988.0	0.40	17.87	0.20	4.79	1.20	45.08	2.00	95.53	7.50	364.88

SECTION 2.8 SET ADVECTIVE AND DISPERSIVE TRANSPORT FACTORS

TRANSPORT FACTORS

CHANNEL NUMBER	VARYING ADVECTION FLOOD TIDE	VARYING ADVECTION EBB TIDE	DIFFUSION FACTORS C4	DIFFUSION FACTORS (A:SQMI/D)
1	1.00	0.0	20.00	1.14
2	1.00	0.0	30.00	4.60
3	1.00	0.0	40.00	7.78
4	1.00	0.0	50.00	10.29
5	1.00	0.0	60.00	12.02
6	1.00	0.0	70.00	13.60
7	1.00	0.0	80.00	14.99
8	1.00	0.0	90.00	16.04
9	0.60	0.0	100.00	10.40
10	0.33	0.0	100.00	10.73
11	0.20	0.0	75.00	11.09
12	1.00	0.33	50.00	1.02
13	0.20	0.0	50.00	2.02
14	0.20	0.0	50.00	1.11
15	0.50	0.0	50.00	5.25
16	0.50	0.0	50.00	1.04
17	0.50	0.0	50.00	0.40
18	0.50	0.0	50.00	4.77
19	0.50	0.0	50.00	0.90
20	0.50	0.10	50.00	8.97
21	0.50	0.0	50.00	2.82
22	0.50	0.0	50.00	0.68
23	0.50	0.0	25.00	0.95
24	0.50	0.25	25.00	4.16
25	0.67	0.33	25.00	2.46
26	0.67	0.33	10.00	1.01
27	0.67	0.33	1.00	0.11
28	0.67	0.33	1.00	0.02
29	0.67	0.33	1.00	0.02
30	0.67	0.33	1.00	0.03
31	0.67	0.33	1.00	0.02
32	0.67	0.33	1.00	0.01
33	0.67	0.33	1.00	0.09
34	0.67	0.33	1.00	0.09
35	0.67	0.33	1.00	0.09
36	0.67	0.33	1.00	0.10
37	0.67	0.33	1.00	0.12
38	0.67	0.33	1.00	0.02
39	0.67	0.33	1.00	0.11
40	0.67	0.33	1.00	0.03
41	0.67	0.33	1.00	0.03
42	0.67	0.33	1.00	0.03
43	0.67	0.33	1.00	0.09
44	0.67	0.33	1.00	0.02

45	0.67	0.33	1.00	0.03
46	0.67	0.33	1.00	0.02
47	0.67	0.33	1.00	0.12
48	0.67	0.33	1.00	0.11
49	0.67	0.33	1.00	0.03
50	0.67	0.33	1.00	0.02
51	0.67	0.33	1.00	0.01
52	0.67	0.33	1.00	0.10
53	0.67	0.33	1.00	0.12
54	0.67	0.33	1.00	0.01
55	0.67	0.33	1.00	0.14
56	0.67	0.33	1.00	0.10
57	0.67	0.33	1.00	0.04
58	0.67	0.33	1.00	0.01
59	0.67	0.33	1.00	0.07
60	0.67	0.33	1.00	0.02
61	0.67	0.33	1.00	0.08
62	0.67	0.33	1.00	0.01
63	0.67	0.33	1.00	0.09
64	0.67	0.33	1.00	0.08
65	0.67	0.33	1.00	0.08
66	0.67	0.33	1.00	0.01
67	0.67	0.33	1.00	0.06
68	0.67	0.33	1.00	0.06
69	0.67	0.33	1.00	0.07
70	0.67	0.33	1.00	0.01
71	0.67	0.33	1.00	0.07
72	0.67	0.33	1.00	0.06
73	0.67	0.33	1.00	0.03
74	0.67	0.33	1.00	0.02
75	0.67	0.33	1.00	0.06
76	0.67	0.33	1.00	0.06
77	0.67	0.33	1.00	0.04
78	0.67	0.33	1.00	0.03
79	0.67	0.33	1.00	0.00
80	0.67	0.33	1.00	0.02
81	0.67	0.33	1.00	0.02
82	0.67	0.33	1.00	0.03

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                    SECTION 3.0  SIMULATE WATER QUALITY CONDITIONS (MAIN QUALITY LOOP)
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HIGH SLACK PREDICTIONS

JUNCTION NUMBER	HEAD (FT)	CONCENTRATION FACTORS 1ST. CONSTIT. (MGL)	2ND. CONSTIT. (MGL)	3RD. CONSTIT. (MGL)	4TH. CONSTIT. (MGL)	5TH. CONSTIT. (MGL)
		CYCLE 800	16 DAYS, 16.00 HOURS			
2	1.5517	0.32	0.12	1.40	2.17	5.50
- 11	1.7957	0.34	0.13	1.41	0.0	5.17
		CYCLE 801	16 DAYS, 16.50 HOURS			
12	1.4382	0.36	0.15	1.40	0.01	6.82
13	1.8378	0.40	0.15	1.49	0.23	5.74
- 20	2.0913	0.39	0.14	1.41	0.15	5.74
		CYCLE 802	16 DAYS, 17.00 HOURS			
22	1.8274	0.44	0.18	1.53	0.41	5.49
23	2.0443	0.46	0.20	1.60	0.56	5.49
24	2.2249	0.49	0.23	1.71	0.90	5.39
25	2.3967	0.52	0.24	1.76	1.11	5.28
- 31	2.5461	0.53	0.24	1.76	1.16	5.30
		CYCLE 803	16 DAYS, 17.50 HOURS			
32	2.1348	0.53	0.24	1.73	1.22	5.18
33	2.3252	0.53	0.25	1.69	1.31	5.55
34	2.5230	0.54	0.28	1.65	1.78	5.69
36	2.6784	0.55	0.31	1.62	1.98	5.44
- 38	2.8251	0.54	0.36	1.55	1.98	5.73
		CYCLE 804	16 DAYS, 18.00 HOURS			
42	2.4187	0.53	0.41	1.50	1.95	5.27
43	2.6028	0.53	0.50	1.36	1.98	4.94
44	2.8276	0.58	0.57	1.23	2.70	3.57
48	2.9832	0.57	0.59	1.15	2.73	2.80
- 49	3.1638	0.60	0.60	1.09	3.64	2.31
		CYCLE 805	16 DAYS, 18.50 HOURS			

51	2.8526	0.60	0.58	1.03	3.37	2.39
52	3.0049	0.57	0.55	1.01	2.72	2.75
55	3.1371	0.62	0.50	1.02	2.38	3.51
56	3.2768	0.58	0.42	1.04	1.80	4.10
58	3.4354	0.49	0.30	1.08	1.15	4.62
59	3.5633	0.43	0.22	1.11	0.69	4.96
- 60	3.6945	0.41	0.20	1.13	0.58	5.19
		CYCLE 806	16 DAYS, 19.00 HOURS			
62	3.4914	0.42	0.21	1.13	0.64	5.35
63	3.6530	0.43	0.23	1.13	0.74	5.46
64	3.8332	0.44	0.26	1.11	0.90	5.61
66	3.9953	0.44	0.28	1.08	1.05	5.79
68	4.1414	0.44	0.32	1.03	1.20	6.22
69	4.2815	0.45	0.37	1.02	1.42	6.55
70	4.4083	0.43	0.29	1.02	1.52	6.91
71	4.5221	0.43	0.27	1.05	1.76	7.33
- 72	4.5951	0.42	0.21	1.04	1.99	7.76
		CYCLE 807	16 DAYS, 19.50 HOURS			
74	4.3412	0.42	0.17	1.03	2.16	8.15
75	4.4045	0.43	0.19	1.06	2.38	8.42
76	4.5145	0.42	0.09	1.06	2.14	8.54

HIGH SLACK PREDICTIONS

JUNCTION NUMBER	HEAD (FT)	CONCENTRATION FACTORS 1ST. CONSTIT. (MGL)	2ND. CONSTIT. (MGL)	3RD. CONSTIT. (MGL)	4TH. CONSTIT. (MGL)	5TH. CONSTIT. (MGL)
		CYCLE 825	17 DAYS, 4.50 HOURS			
2	1.5517	0.32	0.12	1.40	2.17	5.50
- 11	1.7957	0.34	0.13	1.41	0.0	5.19
		CYCLE 826	17 DAYS, 5.00 HOURS			
12	1.4382	0.36	0.15	1.41	0.01	6.50
13	1.8378	0.40	0.15	1.49	0.23	5.55
- 20	2.0913	0.39	0.14	1.41	0.15	5.42
		CYCLE 827	17 DAYS, 5.50 HOURS			
22	1.8274	0.44	0.18	1.53	0.41	5.37
23	2.0443	0.46	0.20	1.61	0.56	5.10
24	2.2249	0.49	0.23	1.71	0.89	4.79
25	2.3967	0.52	0.24	1.76	1.11	4.49
- 31	2.5461	0.53	0.24	1.75	1.16	4.30
		CYCLE 828	17 DAYS, 6.00 HOURS			
32	2.1348	0.53	0.24	1.72	1.22	4.30
33	2.3252	0.53	0.25	1.68	1.31	4.22
34	2.5230	0.54	0.28	1.64	1.78	3.99
36	2.6784	0.55	0.31	1.61	1.98	3.72
- 38	2.8251	0.54	0.36	1.55	1.98	3.60
		CYCLE 829	17 DAYS, 6.50 HOURS			
42	2.4187	0.53	0.41	1.50	1.95	3.32
43	2.6028	0.53	0.50	1.35	1.98	2.32
44	2.8276	0.58	0.57	1.23	2.70	1.69
48	2.9832	0.57	0.59	1.15	2.73	1.50
= 49	3.1638	0.60	0.60	1.09	3.64	1.27
		CYCLE 830	17 DAYS, 7.00 HOURS			

51	2.8526	0.60	0.58	1.03	3.37	1.71
52	3.0049	0.57	0.55	1.01	2.72	2.32
55	3.1371	0.62	0.50	1.02	2.38	3.25
56	3.2768	0.58	0.42	1.04	1.80	3.89
58	3.4354	0.49	0.30	1.08	1.15	4.41
59	3.5633	0.43	0.22	1.11	0.69	4.78
- 60	3.6945	0.41	0.20	1.13	0.58	5.02
		CYCLE 831	17 DAYS, 7.50 HOURS			
62	3.4914	0.42	0.21	1.13	0.64	5.19
63	3.6530	0.43	0.23	1.13	0.74	5.29
64	3.8332	0.44	0.26	1.11	0.90	5.46
66	3.9953	0.44	0.28	1.08	1.05	5.65
68	4.1414	0.44	0.32	1.03	1.20	6.08
69	4.2815	0.45	0.37	1.02	1.42	6.41
70	4.4083	0.43	0.29	1.02	1.52	6.77
71	4.5221	0.43	0.27	1.05	1.76	7.19
= 72	4.5951	0.42	0.21	1.04	1.99	7.57
		CYCLE 832	17 DAYS, 0.00 HOURS			
74	4.3412	0.42	0.17	1,03	2.16	7.81
75	4.4045	0.43	0.19	1.06	2.38	8.25
76	4.5145	0.42	0.09	1.06	2.14	8.62

RESTART DECK TAPE WAS LAST WRITTEN AFTER CYCLE 850
HYDRAULIC CYCLE ON EXTRACT TAPE FOR RESTARTING = 168
NTAG = 4

THE TOTAL MASS (TONS) FOR EACH CONSTITUENT AT CYCLE 850 IS AS FOLLOWS

7611143421952.00 3646003609600.00 22993325522944.00 11895849353216.00 96874715414527.99

THE TOTAL MASS (TONS) DEPLETED FOR EACH CONSTITUENT AS OF CYCLE 850 IS AS FOLLOWS

0.0	0.0	0.0	2416160768.00	0.0

STARTS AT CYCLE 800 (16 DAYS 16.0 HOURS)

WATER QUALITY SUMMARY

ENDS AT CYCLE 850 (17 DAYS 17.0 HOURS)

JUNC	CONSTITUENT 1			CONSTITUENT 2			CONSTITUENT 3			CONSTITUENT 4			CONSTITUENT 5		
	MIN	MAX	AVE	MIN	MAX	AVE	MIN	MAX	AVE	MIN	MAX	AVE	MIN	MAX	AVE
1	0.30	0.30	0.30	0.30	0.30	0.30	1.00	1.00	1.00	1.45	1.45	1.45	7.00	7.00	7.00
2	0.32	0.42	0.37	0.12	0.17	0.15	1.40	1.48	1.44	0.0	2.17	0.69	5.17	6.05	5.66
3	0.10	0.29	0.20	0.04	0.22	0.11	0.37	0.97	0.70	0.01	0.09	0.04	1.05	5.09	2.68
4	0.19	0.29	0.25	0.09	0.19	0.15	0.67	0.99	0.87	0.02	0.08	0.05	2.20	4.60	3.46
5	0.24	0.31	0.28	0.13	0.19	0.17	0.84	1.08	0.97	0.03	0.10	0.07	3.14	4.58	4.03
6	0.27	0.33	0.30	0.16	0.19	0.18	0.92	1.16	1.03	0.05	0.13	0.08	3.84	4.84	4.38
7	0.28	0.35	0.31	0.18	0.19	0.18	0.95	1.23	1.09	0.06	0.15	0.10	4.21	5.06	4.61
8	0.29	0.37	0.33	0.18	0.19	0.18	0.99	1.29	1.14	0.07	0.18	0.13	4.35	5.23	4.78
9	0.30	0.38	0.34	0.17	0.19	0.18	1.04	1.33	1.21	0.09	0.20	0.15	4.46	5.35	4.94
10	0.34	0.39	0.37	0.17	0.18	0.18	1.18	1.38	1.29	0.15	0.23	0.19	4.79	5.46	5.17
11	0.34	0.42	0.38	0.12	0.18	0.15	1.41	1.49	1.44	0.0	0.44	0.16	5.17	6.05	5.65
12	0.36	0.44	0.41	0.15	0.19	0.17	1.40	1.55	1.47	0.01	0.50	0.26	5.56	6.82	6.01
13	0.40	0.47	0.43	0.15	0.21	0.18	1.47	1.61	1.53	0.22	0.68	0.42	5.06	5.79	5.43
14	0.38	0.44	0.41	0.21	0.23	0.22	1.29	1.52	1.40	0.26	0.48	0.36	5.39	6.85	6.27
15	0.37	0.44	0.40	0.21	0.26	0.24	1.21	1.53	1.34	0.21	0.51	0.32	5.69	7.08	6.60
16	0.36	0.38	0.37	0.25	0.26	0.25	1.19	1.28	1.23	0.19	0.27	0.23	6.54	7.20	6.93
17	0.34	0.35	0.34	0.26	0.27	0.27	1.11	1.14	1.13	0.14	0.16	0.15	6.72	7.40	7.06
18	0.40	0.48	0.44	0.13	0.21	0.18	1.50	1.62	1.55	0.33	0.67	0.47	5.04	5.60	5.34
19	0.38	0.41	0.40	0.18	0.22	0.20	1.32	1.44	1.38	0.24	0.38	0.29	6.06	7.22	6.54
20	0.39	0.51	0.45	0.14	0.23	0.19	1.41	1.72	1.56	0.15	0.99	0.52	5.01	5.75	5.35
21	0.44	0.50	0.47	0.19	0.24	0.21	1.54	1.68	1.60	0.39	0.86	0.57	5.21	5.71	5.43
22	0.44	0.52	0.48	0.18	0.24	0.21	1.53	1.76	1.65	0.41	1.17	0.77	4.89	5.51	5.20
23	0.46	0.54	0.51	0.20	0.25	0.23	1.60	1.78	1.71	0.56	1.31	0.97	4.65	5.56	5.05
24	0.49	0.54	0.52	0.23	0.25	0.25	1.70	1.78	1.74	0.89	1.39	1.20	4.54	5.42	4.92
25	0.52	0.53	0.53	0.24	0.26	0.25	1.63	1.77	1.72	1.11	1.44	1.25	4.41	5.34	4.89
26	0.55	0.59	0.57	0.25	0.26	0.25	1.35	1.65	1.51	2.33	4.92	3.54	4.83	8.18	6.60
27	0.52	0.54	0.53	0.28	0.33	0.30	1.16	1.44	1.30	1.52	2.88	2.34	6.18	8.59	7.69
28	0.53	0.58	0.55	0.31	0.32	0.32	1.12	1.22	1.17	2.07	2.29	2.19	6.97	9.26	8.10
29	0.62	0.66	0.64	0.29	0.30	0.29	1.14	1.17	1.16	2.73	3.04	2.85	5.93	8.25	7.05
30	0.75	0.86	0.80	0.01	0.08	0.04	1.89	2.12	1.97	11.86	16.19	13.76	6.11	8.44	7.20
31	0.53	0.54	0.53	0.24	0.29	0.26	1.60	1.76	1.69	1.15	1.74	1.36	4.24	5.35	4.88
32	0.53	0.55	0.54	0.24	0.35	0.28	1.54	1.73	1.64	1.22	2.07	1.60	4.30	5.29	4.85
33	0.53	0.55	0.54	0.25	0.42	0.32	1.48	1.69	1.60	1.31	2.12	1.78	3.99	5.66	4.81
34	0.54	0.55	0.54	0.28	0.50	0.38	1.35	1.65	1.52	1.78	2.25	2.07	3.42	5.76	4.46
35	0.51	0.54	0.53	0.38	0.42	0.40	1.45	1.52	1.49	1.67	2.01	1.83	3.36	6.63	5.33
36	0.52	0.55	0.54	0.31	0.57	0.44	1.22	1.62	1.44	1.87	2.30	2.06	2.50	5.49	3.93
37	0.51	0.54	0.53	0.36	0.54	0.42	1.29	1.55	1.46	1.62	2.25	1.86	2.93	8.22	5.37
38	0.53	0.57	0.54	0.36	0.58	0.48	1.20	1.55	1.37	1.94	2.70	2.20	2.10	5.79	3.71
39	0.53	0.56	0.55	0.44	0.67	0.57	1.25	1.42	1.31	2.12	2.33	2.18	2.56	6.59	4.71
40	0.98	1.28	1.10	2.00	3.03	2.42	1.61	1.86	1.70	3.99	5.26	4.48	5.13	9.62	7.97
41	0.52	0.53	0.53	0.49	0.53	0.51	1.20	1.31	1.26	1.95	2.35	2.12	2.67	6.88	4.36
42	0.53	0.59	0.55	0.41	0.59	0.52	1.15	1.50	1.30	1.93	2.99	2.38	1.61	5.27	2.99
43	0.53	0.59	0.56	0.50	0.59	0.56	1.12	1.36	1.22	1.98	3.14	2.61	1.63	4.94	2.71
44	0.58	0.60	0.59	0.57	0.59	0.58	1.08	1.23	1.15	2.70	3.38	3.09	1.59	3.57	2.20
45	0.56	0.57	0.57	0.10	0.35	0.24	1.60	2.01	1.78	3.07	3.17	3.13	4.26	7.29	5.80
46	0.57	0.58	0.58	0.09	0.12	0.10	1.86	1.90	1.88	3.32	3.58	3.43	5.25	6.52	5.94
47	0.59	0.60	0.60	0.09	0.09	0.09	1.93	1.96	1.96	4.62	4.83	4.71	5.46	6.68	6.12
48	0.57	0.59	0.58	0.56	0.60	0.59	0.99	1.15	1.06	2.71	3.46	3.11	1.44	2.80	2.02

49	0.59	0.61	0.60	0.49	0.60	0.56	1.01	1.09	1.03	2.59	3.89	3.37	1.26	3.37	2.35
50	0.56	0.57	0.57	0.57	0.58	0.57	0.98	1.00	0.99	0.97	1.46	1.22	4.88	6.69	5.96
51	0.55	0.60	0.57	0.42	0.58	0.51	1.00	1.03	1.02	1.33	3.38	2.34	1.71	4.00	3.00
52	0.53	0.60	0.57	0.32	0.55	0.45	1.01	1.08	1.03	1.40	2.72	1.97	2.32	4.61	3.66
53	0.53	0.60	0.56	0.38	0.50	0.46	1.01	1.13	1.06	1.40	1.98	1.72	3.26	4.54	4.03
54	0.70	0.81	0.74	1.42	2.09	1.68	1.65	2.04	1.80	4.68	6.75	5.46	4.78	5.57	5.20
55	0.47	0.63	0.56	0.23	0.50	0.37	1.02	1.10	1.05	0.96	2.39	1.67	3.25	4.84	4.20
56	0.37	0.58	0.46	0.17	0.42	0.27	1.04	1.13	1.09	0.29	1.80	0.91	3.89	5.14	4.65
57	0.37	0.39	0.38	0.31	0.34	0.32	1.12	1.13	1.13	0.72	0.79	0.75	4.92	5.29	5.16
58	0.41	0.49	0.43	0.19	0.30	0.22	1.08	1.13	1.11	0.54	1.15	0.73	4.41	5.20	4.91
59	0.41	0.43	0.42	0.20	0.22	0.21	1.11	1.13	1.12	0.54	0.69	0.61	4.78	5.35	5.12
60	0.41	0.45	0.43	0.20	0.24	0.22	1.11	1.13	1.12	0.58	0.86	0.70	5.02	5.52	5.31
61	0.59	0.63	0.61	0.29	0.31	0.30	1.03	1.06	1.05	1.47	1.67	1.56	4.27	4.69	4.47
62	0.42	0.44	0.43	0.21	0.27	0.24	1.10	1.13	1.12	0.64	0.95	0.80	5.19	5.66	5.45
63	0.43	0.45	0.44	0.23	0.29	0.26	1.08	1.13	1.11	0.74	1.09	0.93	5.29	5.85	5.59
64	0.44	0.45	0.44	0.26	0.31	0.29	1.06	1.11	1.09	0.90	1.18	1.05	5.46	6.07	5.78
65	0.92	1.04	0.98	0.34	0.36	0.35	2.26	2.57	2.40	1.32	1.38	1.35	6.21	6.54	6.40
66	0.44	0.44	0.44	0.28	0.33	0.31	1.01	1.08	1.04	1.05	1.34	1.20	5.65	6.42	6.07
67	0.43	0.44	0.43	0.30	0.33	0.32	1.02	1.06	1.04	1.14	1.27	1.21	5.89	6.38	6.16
68	0.44	0.44	0.44	0.32	0.35	0.34	1.01	1.03	1.02	1.20	1.49	1.36	6.08	6.78	6.47
69	0.44	0.45	0.45	0.31	0.37	0.34	1.02	1.03	1.02	1.42	1.63	1.54	6.41	7.00	6.75
70	0.42	0.43	0.43	0.24	0.29	0.26	1.02	1.04	1.03	1.52	1.69	1.61	6.77	7.27	7.05
71	0.43	0.44	0.43	0.25	0.27	0.26	1.05	1.06	1.05	1.76	1.98	1.87	7.18	7.65	7.44
72	0.42	0.43	0.43	0.21	0.24	0.23	1.04	1.07	1.05	1.99	2.19	2.10	7.55	8.00	7.80
73	1.18	1.46	1.31	2.68	3.61	3.11	2.42	2.93	2.66	2.99	3.34	3.15	4.19	5.41	4.82
74	0.41	0.42	0.41	0.15	0.17	0.16	1.03	1.04	1.03	2.15	2.25	2.21	7.75	8.35	8.08
75	0.42	0.43	0.42	0.17	0.19	0.18	1.05	1.07	1.06	2.33	2.39	2.36	8.11	8.59	8.37
76	0.41	0.42	0.42	0.08	0.09	0.08	1.04	1.06	1.06	2.09	2.14	2.12	8.39	8.64	8.52

RESTART DECK TAPE WAS LAST WRITTEN AFTER CYCLE 1050
HYDRAULIC CYCLE ON EXTRACT TAPE FOR RESTARTING = 168
NTAG = 4

THE TOTAL MASS (TONS) FOR EACH CONSTITUENT AT CYCLE 1050 IS AS FOLLOWS

8107920982016.00 3829164670976.00 244202445209 60.00 118593347911 68.00 103972702519296.00

THE TOTAL MASS (TONS) DEPLETED FOR EACH CONSTITUENT AS OF CYCLE 1050 IS AS FOLLOWS

0.0 0.0 0.0 4663205888.00 0.0

LOW SLACK PREDICTIONS

JUNCTION NUMBER	HEAD (FT)	CONCENTRATION FACTORS 1ST. CONSTIT. (MGL)	2ND. CONSTIT. (MGL)	3RD. CONSTIT. (MGL)	4TH. CONSTIT. (MGL)	5TH. CONSTIT. (MGL)
		CYCLE 1064	22 DAYS,	4.00 HOURS		
2	-0.9948	0.42	0.17	1.48	0.32	5.61
- 11	-1.2327	0.42	0.17	1.48	0.33	5.57
		CYCLE 1065	22 DAYS,	4.50 HOURS		
12	-0.7069	0.44	0.19	1.54	0.49	5.36
13	-1.1629	0.46	0.21	1.59	0.67	5.02
- 20	-1.5285	0.50	0.23	1.70	0.99	4.71
		CYCLE 1066	22 DAYS,	5.00 HOURS		
22	-1.1872	0.52	0.24	1.73	1.16	4.48
23	-1.4942	0.53	0.25	1.72	1.31	4.29
24	-1.7589	0.53	0.25	1.67	1.39	4.37
- 25	-1.9933	0.52	0.25	1.61	1.44	4.28
		CYCLE 1067	22 DAYS,	5.50 HOURS		
31	-1.3223	0.53	0.29	1.58	1.74	3.99
32	-1.5936	0.54	0.35	1.53	2.06	3.66
33	-1.8733	0.53	0.42	1.47	2.09	3.21
- 34	-2.1044	0.54	0.50	1.36	2.19	2.66
		CYCLE 1068	22 DAYS,	6.00 HOURS		
36	-1.4259	0.54	0.57	1.22	2.30	1.68
38	-1.7305	0.57	0.58	1.20	2.70	1.57
42	-1.9449	0.58	0.59	1.15	2.99	1.33
- 43	-2.1394	0.59	0.59	1.12	3.14	1.57
		CYCLE 1069	22 DAYS,	6.50 HOURS		
44	-1.6462	0.60	0.57	1.08	3.36	1.80
48	-1.8908	0.58	0.56	0.99	3.04	2.11
49	-2.1318	0.59	0.49	1.02	2.59	3.22

= 51	-2.3012	0.55	0.42	1.03	1.34	3.93
		CYCLE 1070	22 DAYS, 7.00 HOURS			
52	-1.7276	0.53	0.32	1.07	1.41	4.42
55	-1.9346	0.47	0.23	1.09	0.96	4.71
56	-2.1232	0.37	0.17	1.13	0.29	4.96
- 58	-2.2700	0.42	0.20	1.13	0.65	4.99
		CYCLE 1071	22 DAYS, 7.50 HOURS			
59	-1.5720	0.42	0.22	1.12	0.66	5.05
60	-1.8488	0.44	0.24	1.11	0.86	5.07
62	-2.0390	0.44	0.27	1.10	0.95	5.08
63	-2.1636	0.45	0.29	1.08	1.09	5.15
- 64	-2.2396	0.45	0.31	1.07	1.18	5.28
		CYCLE 1072	22 DAYS, 8.00 HOURS			
66	-1.7516	0.44	0.33	1.01	1.34	5.47
68	-1.9550	0.44	0.34	1.01	1.49	5.78
69	-2.1250	0.44	0.31	1.03	1.63	5.94
70	-2.2396	0.42	0.24	1.04	1.69	6.17
= 71	-2.2856	0.44	0.25	1.06	1.98	6.47
		CYCLE 1073	22 DAYS, 8.50 HOURS			
72	-1.9365	0.43	0.23	1.06	2.18	6.65
- 74	-2.0499	0.41	0.15	1.03	2.23	6.87
		CYCLE 1074	22 DAYS, 9.00 HOURS			
76	-0.9482	0.41	0.08	1.04	2.10	7.22

LOW SLACK PREDICTIONS

JUNCTION NUMBER	HEAD (FT)	CONCENTRATION FACTORS 1ST. CONSTIT. (MGL)	2ND. CONSTIT. (MGL)	3RD. CONSTIT. (MGL)	4TH. CONSTIT. (MGL)	5TH. CONSTIT. (MGL)
		CYCLE 1089	22 DAYS, 16.50 HOURS			
2	-0.9948	0.42	0.17	1.47	0.32	5.88
_ 11	-1.2327	0.42	0.17	1.48	0.33	5.88
		CYCLE 1090	22 DAYS, 17.00 HOURS			
12	-0.7069	0.44	0.19	1.53	0.49	5.77
13	-1.1629	0.46	0.21	1.59	0.67	5.53
_ 20	-1.5285	0.50	0.23	1.70	0.99	5.41
		CYCLE 1091	22 DAYS, 17.50 HOURS			
22	-1.1872	0.52	0.24	1.73	1.16	5.35
23	-1.4942	0.53	0.25	1.72	1.31	5.43
24	-1.7589	0.53	0.25	1.67	1.39	5.41
_ 25	-1.9933	0.52	0.25	1.61	1.44	5.66
		CYCLE 1092	22 DAYS, 18.00 HOURS			
31	-1.3223	0.53	0.29	1.58	1.74	5.77
32	-1.5936	0.54	0.35	1.53	2.06	5.74
33	-1.8733	0.53	0.42	1.47	2.09	5.57
= 34	-2.1044	0.54	0.50	1.36	2.19	4.78
		CYCLE 1093	22 DAYS, 18.50 HOURS			
36	-1.4259	0.54	0.57	1.22	2.30	3.70
38	-1.7305	0.57	0.58	1.20	2.70	3.35
42	-1.9449	0.59	0.59	1.15	2.99	2.46
_ 43	-2.1394	0.59	0.59	1.12	3.14	2.61
		CYCLE 1094	22 DAYS, 19.00 HOURS			
44	-1.6462	0.60	0.57	1.08	3.36	2.19
48	-1.8908	0.58	0.56	0.99	3.04	2.58
49	-2.1318	0.59	0.49	1.02	2.59	3.36

- 51	-2.3012	0.55	0.42	1.03	1.34	4.05
		CYCLE 1095	22 DAYS, 19.50 HOURS			
52	-1.7276	0.53	0.32	1.07	1.41	4.62
55	-1.9346	0.47	0.23	1.09	0.96	4.82
56	-2.1232	0.37	0.17	1.13	0.29	5.07
- 58	-2.2700	0.42	0.20	1.13	0.65	5.07
		CYCLE 1096	22 DAYS, 20.00 HOURS			
59	-1.5720	0.42	0.22	1.12	0.66	5.10
60	-1.8488	0.44	0.24	1.11	0.86	5.11
62	-2.0390	0.44	0.27	1.10	0.95	5.11
63	-2.1636	0.45	0.29	1.08	1.09	5.19
= 64	-2.2396	0.45	0.31	1.07	1.18	5.35
		CYCLE 1097	22 DAYS, 20.50 HOURS			
66	-1.7516	0.44	0.33	1.01	1.34	5.55
68	-1.9550	0.44	0.34	1.01	1.49	5.87
69	-2.1250	0.44	0.31	1.03	1.63	6.05
70	-2.2396	0.42	0.24	1.04	1.69	6.29
- 71	-2.2856	0.44	0.25	1.06	1.98	6.61
		CYCLE 1098	22 DAYS, 21.00 HOURS			
72	-1.9365	0.43	0.23	1.06	2.18	6.84
- 74	-2.0499	0.41	0.15	1.03	2.23	7.01
		CYCLE 1099	22 DAYS, 21.50 HOURS			
76	-0.9482	0.41	0.08	1.04	2.10	7.10

********** WATER QUALITY SUMMARY **********

STARTS AT CYCLE 1050 (21 DAYS 21.0 HOURS)

ENDS AT CYCLE 1100 (22 DAYS 22.0 HOURS)

JUNC	CONSTITUENT 1			CONSTITUENT 2			CONSTITUENT 3			CONSTITUENT 4			CONSTITUENT 5		
	MIN	MAX	AVE	MIN	MAX	AVE	MIN	MAX	AVE	MIN	MAX	AVE	MIN	MAX	AVE
1	0.30	0.30	0.30	0.30	0.30	0.30	1.00	1.00	1.00	1.45	1.45	1.45	7.00	7.00	7.00
2	0.32	0.42	0.37	0.12	0.17	0.15	1.40	1.48	1.43	0.0	2.17	0.69	5.12	6.00	5.66
3	0.07	0.26	0.16	0.04	0.21	0.10	0.24	0.88	0.54	0.01	0.08	0.03	1.08	5.13	2.68
4	0.14	0.26	0.21	0.08	0.18	0.13	0.48	0.87	0.72	0.02	0.07	0.04	2.20	4.70	3.47
5	0.20	0.29	0.25	0.12	0.18	0.16	0.66	1.00	0.84	0.03	0.09	0.06	3.12	4.61	4.04
6	0.23	0.32	0.27	0.15	0.18	0.17	0.78	1.09	0.93	0.04	0.11	0.08	3.82	4.84	4.39
7	0.25	0.34	0.29	0.17	0.18	0.17	0.85	1.18	1.00	0.05	0.14	0.09	4.20	5.06	4.62
8	0.26	0.35	0.31	0.17	0.18	0.17	0.89	1.25	1.07	0.07	0.16	0.11	4.36	5.25	4.79
9	0.28	0.37	0.33	0.17	0.18	0.17	0.95	1.30	1.15	0.08	0.18	0.13	4.48	5.38	4.95
10	0.32	0.38	0.36	0.17	0.18	0.17	1.11	1.35	1.25	0.14	0.21	0.17	4.80	5.48	5.17
11	0.33	0.42	0.38	0.12	0.17	0.15	1.40	1.48	1.44	0.0	0.43	0.15	5.12	6.00	5.65
12	0.37	0.44	0.41	0.15	0.19	0.17	1.43	1.54	1.47	0.0	0.49	0.25	5.36	6.70	6.01
13	0.40	0.46	0.43	0.15	0.21	0.17	1.46	1.59	1.51	0.19	0.67	0.40	4.88	5.68	5.44
14	0.38	0.44	0.41	0.21	0.23	0.22	1.29	1.51	1.39	0.25	0.47	0.35	5.46	7.03	6.27
15	0.37	0.44	0.40	0.21	0.26	0.24	1.22	1.51	1.34	0.20	0.50	0.32	5.80	7.28	6.60
16	0.36	0.39	0.37	0.25	0.26	0.26	1.20	1.29	1.24	0.19	0.26	0.22	6.65	7.32	6.93
17	0.34	0.35	0.35	0.27	0.27	0.27	1.13	1.16	1.14	0.14	0.15	0.14	6.70	7.36	7.06
18	0.40	0.47	0.44	0.13	0.21	0.18	1.47	1.61	1.53	0.32	0.66	0.46	5.02	5.73	5.34
19	0.39	0.41	0.40	0.18	0.22	0.20	1.32	1.43	1.38	0.23	0.37	0.28	5.87	7.06	6.54
20	0.38	0.50	0.44	0.14	0.23	0.18	1.39	1.70	1.54	0.13	0.99	0.51	4.69	5.64	5.35
21	0.44	0.50	0.46	0.19	0.24	0.21	1.52	1.67	1.58	0.38	0.86	0.56	4.88	5.78	5.43
22	0.43	0.52	0.48	0.18	0.24	0.21	1.51	1.74	1.63	0.39	1.17	0.76	4.48	5.59	5.21
23	0.46	0.53	0.50	0.20	0.25	0.23	1.59	1.75	1.69	0.55	1.31	0.97	4.25	5.48	5.06
24	0.49	0.53	0.52	0.23	0.25	0.24	1.67	1.76	1.72	0.89	1.39	1.19	4.26	5.44	4.93
25	0.52	0.53	0.52	0.24	0.25	0.24	1.61	1.74	1.69	1.11	1.44	1.25	4.18	5.67	4.89
26	0.54	0.59	0.56	0.25	0.26	0.25	1.34	1.62	1.49	2.33	4.92	3.54	4.99	9.03	6.60
27	0.52	0.54	0.53	0.27	0.33	0.30	1.16	1.42	1.29	1.52	2.88	2.34	6.47	9.26	7.68
28	0.53	0.58	0.55	0.31	0.32	0.32	1.12	1.21	1.16	2.07	2.29	2.19	6.82	9.09	8.08
29	0.62	0.66	0.64	0.29	0.30	0.29	1.14	1.17	1.16	2.73	3.04	2.85	5.67	7.89	7.02
30	0.76	0.86	0.80	0.01	0.08	0.04	1.89	2.13	1.98	11.86	16.19	13.76	6.13	8.24	7.13
31	0.52	0.53	0.52	0.24	0.29	0.25	1.58	1.73	1.66	1.15	1.74	1.36	3.98	5.77	4.88
32	0.52	0.54	0.53	0.24	0.35	0.28	1.53	1.70	1.62	1.22	2.07	1.60	3.64	5.74	4.85
33	0.52	0.54	0.53	0.24	0.42	0.31	1.47	1.66	1.58	1.31	2.12	1.78	3.13	5.57	4.80
34	0.53	0.55	0.54	0.28	0.50	0.38	1.35	1.62	1.51	1.78	2.25	2.07	2.52	5.31	4.45
35	0.51	0.53	0.52	0.38	0.42	0.40	1.44	1.50	1.47	1.67	2.01	1.83	3.76	7.83	5.28
36	0.52	0.54	0.53	0.31	0.58	0.44	1.22	1.60	1.43	1.87	2.30	2.06	1.68	5.05	3.92
37	0.51	0.54	0.52	0.36	0.54	0.42	1.29	1.54	1.45	1.62	2.25	1.86	2.37	7.24	5.33
38	0.53	0.57	0.54	0.36	0.58	0.48	1.20	1.54	1.36	1.94	2.70	2.20	1.57	5.14	3.69
39	0.53	0.56	0.55	0.44	0.67	0.57	1.24	1.41	1.31	2.12	2.33	2.18	2.98	7.95	4.64
40	0.97	1.28	1.10	2.00	3.03	2.42	1.60	1.85	1.70	3.99	5.26	4.48	6.10	10.95	7.90
41	0.52	0.53	0.52	0.49	0.53	0.51	1.20	1.30	1.26	1.95	2.35	2.12	2.12	5.45	4.32
42	0.53	0.59	0.55	0.41	0.59	0.52	1.15	1.49	1.30	1.93	2.99	2.38	1.33	4.66	2.99
43	0.52	0.59	0.56	0.50	0.59	0.56	1.12	1.35	1.22	1.98	3.14	2.61	1.57	3.87	2.69
44	0.58	0.60	0.59	0.57	0.59	0.58	1.08	1.22	1.15	2.70	3.38	3.09	1.76	2.87	2.20
45	0.56	0.57	0.57	0.10	0.35	0.24	1.60	2.01	1.78	3.07	3.17	3.13	4.66	7.65	5.79
46	0.57	0.58	0.58	0.09	0.12	0.10	1.86	1.90	1.88	3.32	3.58	3.43	5.29	6.52	5.94
47	0.59	0.60	0.60	0.09	0.10	0.09	1.93	1.96	1.96	4.62	4.83	4.71	5.54	6.74	6.09
48	0.57	0.59	0.58	0.56	0.60	0.59	0.99	1.15	1.06	2.71	3.46	3.11	1.59	2.58	2.02

49	0.59	0.61	0.60	0.49	0.60	0.56	1.01	1.09	1.03	2.59	3.89	3.37	1.72	3.36	2.34
50	0.56	0.57	0.57	0.57	0.58	0.57	0.98	1.00	0.99	0.97	1.46	1.22	5.42	7.12	5.94
51	0.55	0.60	0.57	0.42	0.59	0.51	1.01	1.03	1.02	1.33	3.38	2.34	2.02	4.05	3.00
52	0.53	0.60	0.57	0.32	0.55	0.45	1.01	1.08	1.03	1.40	2.72	1.97	2.53	4.64	3.66
53	0.53	0.60	0.56	0.38	0.50	0.46	1.01	1.13	1.06	1.40	1.98	1.72	3.42	4.56	4.03
54	0.70	0.81	0.74	1.42	2.09	1.68	1.65	2.04	1.81	4.68	6.75	5.46	4.97	5.67	5.19
55	0.47	0.63	0.56	0.23	0.51	0.37	1.02	1.10	1.06	0.96	2.39	1.67	3.38	4.84	4.19
56	0.37	0.58	0.46	0.17	0.42	0.27	1.04	1.13	1.09	0.29	1.80	0.91	3.99	5.10	4.63
57	0.37	0.39	0.38	0.31	0.34	0.32	1.12	1.13	1.13	0.72	0.79	0.75	4.99	5.39	5.15
58	0.41	0.49	0.43	0.19	0.30	0.22	1.08	1.13	1.11	0.54	1.15	0.73	4.51	5.10	4.86
59	0.41	0.43	0.42	0.20	0.22	0.21	1.11	1.13	1.12	0.54	0.69	0.61	4.84	5.17	5.02
60	0.41	0.45	0.43	0.20	0.24	0.22	1.11	1.13	1.12	0.58	0.86	0.70	5.03	5.24	5.12
61	0.59	0.63	0.61	0.29	0.31	0.30	1.03	1.06	1.05	1.47	1.67	1.56	4.22	4.54	4.42
62	0.42	0.44	0.43	0.21	0.27	0.24	1.10	1.13	1.12	0.64	0.95	0.80	5.06	5.27	5.13
63	0.43	0.45	0.44	0.23	0.29	0.26	1.08	1.13	1.11	0.74	1.09	0,93	5.06	5.26	5.14
64	0.44	0.45	0.44	0.26	0.31	0.29	1.06	1.11	1.09	0.90	1.18	1.05	5.10	5.35	5.21
65	0.92	1.04	0.98	0.34	0.36	0.35	2.26	2.57	2.40	1.32	1.38	1.35	6.18	6.52	6.31
66	0.44	0.44	0.44	0.28	0.33	0.31	1.01	1.08	1.04	1.05	1.34	1.20	5.13	5.58	5.35
67	0.43	0.44	0.43	0.30	0.33	0.32	1.02	1.06	1.04	1.14	1.27	1.21	5.28	5.58	5.41
68	0.44	0.44	0.44	0.32	0.35	0.34	1.01	1.03	1.02	1.20	1.49	1.36	5.41	5.89	5.64
69	0.44	0.45	0.45	0.31	0.37	0.34	1.02	1.03	1.02	1.42	1.63	1.54	5.64	6.07	5.84
70	0.42	0.43	0.43	0.24	0.29	0.26	1.02	1.04	1.03	1.52	1.69	1.61	5.91	6.29	6.09
71	0.43	0.44	0.43	0.25	0.27	0.26	1.05	1.06	1.05	1.76	1.98	1.87	6.26	6.62	6.41
72	0.42	0.43	0.43	0.21	0.24	0.23	1.04	1.07	1.05	1.99	2.19	2.10	6.56	6.90	6.69
73	1.18	1.46	1.31	2,68	3.61	3.11	2.42	2.93	2.66	2.99	3.34	3.15	3.99	4.81	4.45
74	0.41	0.42	0.41	0.15	0.17	0.16	1.03	1.04	1.03	2.15	2.25	2.21	6.76	7.14	6.89
75	0.42	0.43	0.42	0.17	0.19	0.18	1.05	1.07	1.06	2.33	2.39	2.36	6.95	7.33	7.14
76	0.41	0.42	0.42	0.08	0.09	0.08	1.04	1.06	1.06	2.09	2.14	2.12	7.10	7.32	7.24

********** WATER QUALITY SUMMARY **********

STARTS AT CYCLE 800 (16 DAYS 16.0 HOURS)

ENDS AT CYCLE 1200 (25 DAYS 24.0 HOURS)

JUNC	CONSTITUENT 1			CONSTITUENT 2			CONSTITUENT 3			CONSTITUENT 4			CONSTITUENT 5		
	MIN	MAX	AVE	MIN	MAX	AVE	MIN	MAX	AVE	MIN	MAX	AVE	MIN	MAX	AVE
1	0.0	0.30	0.30	0.0	0.30	0.30	0.0	1.00	1.00	0.0	1.45*******		0.0	7.00	6.99
2	0.32	0.42	0.37	0.12	0.17	0.15	1.40	1.49	1.44	0.0	2.17	0.66	5.12	6.05	5.67
3	0.06	0.29	0.17	0.04	0.22	0.11	0.22	0.97	0.59	0.01	0.09	0.04	1.04	5.14	2.70
4	0.13	0.29	0.23	0.08	0.19	0.14	0.45	0.99	0.77	0.02	0.08	0.04	2.17	4.70	3.48
5	0.19	0.31	0.26	0.12	0.19	0.16	0.62	1.08	0.88	0.03	0.10	0.06	3.10	4.62	4.04
6	0.22	0.33	0.28	0.15	0.19	0.17	0.75	1.16	0.96	0.04	0.13	0.08	3.80	4.88	4.39
7	0.24	0.35	0.30	0.16	0.19	0.18	0.82	1.23	1.03	0.05	0.15	0.10	4.17	5.09	4.62
8	0.26	0.37	0.32	0.17	0.19	0.18	0.86	1.29	1.10	0.06	0.18	0.12	4.32	5.28	4.79
9	0.27	0.38	0.33	0.17	0.19	0.17	0.93	1.33	1.17	0.08	0.20	0.14	4.43	5.41	4.95
10	0.32	0.39	0.36	0.16	0.18	0.17	1.09	1.38	1.27	0.13	0.23	0.18	4.75	5.52	5.17
11	0.33	0.42	0.38	0.12	0.18	0.15	1.40	1.49	1.44	0.0	0.44	0.16	5.12	6.05	5.66
12	0.36	0.45	0.41	0.15	0.19	0.17	1.40	1.55	1.48	0.0	0.50	0.26	5.34	6.83	5.99
13	0.40	0.47	0.43	0.15	0.21	0.18	1.44	1.61	1.52	0.19	0.68	0.41	4.88	5.79	5.43
14	0.38	0.44	0.41	0.21	0.23	0.22	1.28	1.52	1.39	0.25	0.48	0.35	5.34	7.07	6.28
15	0.37	0.44	0.40	0.21	0.26	0.24	1.21	1.53	1.33	0.20	0.51	0.32	5.65	7.31	6.62
16	0.36	0.39	0.37	0.25	0.26	0.26	1.19	1.29	1.24	0.19	0.27	0.22	6.51	7.33	6.93
17	0.34	0.35	0.35	0.26	0.27	0.27	1.11	1.16	1.14	0.14	0.16	0.15	6.70	7.40	7.05
18	0.39	0.48	0.44	0.13	0.21	0.18	1.46	1.62	1.54	0.32	0.67	0.46	4.95	5.74	5.34
19	0.38	0.41	0.40	0.18	0.22	0.20	1.32	1.44	1.38	0.23	0.38	0.28	5.82	7.26	6.53
20	0.38	0.51	0.44	0.14	0.23	0.19	1.38	1.72	1.55	0.13	0.99	0.52	4.65	5.76	5.35
21	0.43	0.50	0.46	0.18	0.24	0.21	1.50	1.68	1.59	0.38	0.86	0.56	4.85	5.86	5.43
22	0.43	0.52	0.48	0.18	0.24	0.21	1.50	1.76	1.64	0.39	1.17	0.77	4.42	5.59	5.20
23	0.46	0.54	0.50	0.20	0.25	0.23	1.58	1.78	1.70	0.55	1.31	0.98	4.20	5.56	5.05
24	0.49	0.54	0.52	0.23	0.25	0.24	1.67	1.76	1.72	0.89	1.39	1.20	4.26	5.47	4.92
25	0.51	0.53	0.53	0.24	0.26	0.24	1.60	1.77	1.70	1.11	1.44	1.25	4.18	5.70	4.89
26	0.54	0.59	0.57	0.25	0.26	0.25	1.34	1.65	1.49	2.33	4.92	3.56	4.64	9.20	6.62
27	0.52	0.54	0.53	0.27	0.33	0.30	1.15	1.44	1.29	1.52	2.88	2.34	6.01	9.32	7.69
28	0.53	0.58	0.55	0.31	0.32	0.32	1.12	1.22	1.16	2.07	2.29	2.19	6.70	9.26	8.08
29	0.62	0.66	0.64	0.29	0.30	0.29	1.14	1.17	1.16	2.73	3.04	2.85	5.61	8.33	7.02
30	0.75	0.86	0.80	0.01	0.08	0.04	1.89	2.13	1.98	11.86	16.19	13.79	6.04	8.44	7.15
31	0.52	0.54	0.53	0.23	0.29	0.25	1.58	1.76	1.67	1.15	1.74	1.36	3.97	5.78	4.87
32	0.52	0.55	0.53	0.24	0.35	0.28	1.52	1.73	1.62	1.22	2.07	1.60	3.63	5.89	4.85
33	0.52	0.55	0.53	0.24	0.42	0.32	1.47	1.69	1.58	1.31	2.12	1.78	3.13	5.89	4.79
34	0.53	0.55	0.54	0.28	0.50	0.38	1.35	1.65	1.51	1.78	2.25	2.07	2.52	5.80	4.44
35	0.51	0.54	0.52	0.38	0.42	0.40	1.44	1.52	1.48	1.67	2.01	1.83	3.34	7.83	5.30
36	0.52	0.55	0.54	0.31	0.58	0.44	1.22	1.62	1.43	1.87	2.30	2.06	1.68	5.54	3.91
37	0.51	0.54	0.52	0.36	0.54	0.42	1.29	1.55	1.45	1.62	2.25	1.86	2.37	8.42	5.31
38	0.53	0.57	0.54	0.36	0.58	0.49	1.20	1.55	1.36	1.94	2.70	2.20	1.57	5.83	3.68
39	0.53	0.56	0.55	0.44	0.67	0.57	1.24	1.42	1.31	2.12	2.33	2.18	2.26	7.95	4.68
40	0.97	1.28	1.10	2.00	3.03	2.42	1.60	1.86	1.70	3.99	5.26	4.49	5.06	10.95	7.93
41	0.52	0.53	0.52	0.49	0.53	0.51	1.20	1.31	1.26	1.95	2.35	2.12	2.12	6.88	4.32
42	0.53	0.59	0.55	0.41	0.59	0.52	1.15	1.50	1.30	1.93	2.99	2.39	1.31	5.27	2.97
43	0.52	0.59	0.56	0.50	0.59	0.56	1.12	1.36	1.22	1.98	3.14	2.61	1.44	4.94	2.69
44	0.58	0.60	0.59	0.57	0.59	0.58	1.08	1.23	1.15	2.70	3.38	3.09	1.52	3.57	2.19
45	0.56	0.57	0.57	0.10	0.35	0.24	1.60	2.01	1.78	3.07	3.17	3.13	4.21	7.68	5.80
46	0.57	0.58	0.58	0.09	0.12	0.10	1.86	1.90	1.88	3.32	3.58	3.43	5.25	6.58	5.93
47	0.59	0.60	0.60	0.09	0.10	0.09	1.93	1.96	1.96	4.62	4.83	4.71	5.46	6.74	6.10
48	0.57	0.59	0.58	0.56	0.60	0.59	0.99	1.15	1.06	2.71	3.46	3.11	1.38	2.80	2.01

49	0.59	0.61	0.60	0.49	0.60	0.56	1.01	1.09	1.03	2.59	3.89	3.37	1.26	3.44	2.35
50	0.56	0.57	0.57	0.57	0.58	0.57	0.98	1.00	0.99	0.97	1.46	1.22	4.88	7.15	5.95
51	0.55	0.60	0.57	0.42	0.59	0.51	1.00	1.03	1.02	1.33	3.38	2.33	1.71	4.06	3.00
52	0.53	0.60	0.57	0.32	0.55	0.45	1.01	1.08	1.03	1.40	2.72	1.97	2.32	4.68	3.65
53	0.53	0.60	0.56	0.38	0.50	0.46	1.01	1.13	1.06	1.40	1.98	1.73	3.26	4.61	4.02
54	0.70	0.81	0.74	1.42	2.09	1.68	1.65	2.04	1.81	4.68	6.75	5.47	4.78	5.70	5.19
55	0.47	0.63	0.56	0.23	0.51	0.37	1.02	1.10	1.06	0.96	2.39	1.67	3.25	4.89	4.18
56	0.37	0.58	0.46	0.17	0.42	0.27	1.04	1.13	1.09	0.29	1.80	0.90	3.89	5.18	4.62
57	0.37	0.39	0.38	0.31	0.34	0.32	1.12	1.13	1.13	0.72	0.79	0.75	4.92	5.39	5.14
58	0.41	0.49	0.43	0.19	0.30	0.22	1.08	1.13	1.11	0.54	1.15	0.73	4.41	5.23	4.86
59	0.41	0.43	0.42	0.20	0.22	0.21	1.11	1.13	1.12	0.54	0.69	0.61	4.69	5.38	5.04
60	0.41	0.45	0.43	0.20	0.24	0.22	1.11	1.13	1.12	0.58	0.86	0.70	4.82	5.55	5.18
61	0.59	0.63	0.61	0.29	0.31	0.30	1.03	1.06	1.05	1.47	1.67	1.56	4.16	4.69	4.43
62	0.42	0.44	0.43	0.21	0.27	0.24	1.10	1.13	1.12	0.64	0.95	0.80	4.82	5.68	5.26
63	0.43	0.45	0.44	0.23	0.29	0.26	1.08	1.13	1.11	0.74	1.09	0.93	4.85	5.86	5.34
64	0.44	0.45	0.44	0.26	0.31	0.29	1.06	1.11	1.09	0.90	1.18	1.05	4.89	6.08	5.47
65	0.92	1.04	0.98	0.34	0.36	0.35	2.26	2.57	2.40	1.32	1.38	1.35	6.08	6.60	6.35
66	0.44	0.44	0.44	0.28	0.33	0.31	1.01	1.08	1.04	1.05	1.34	1.20	4.99	6.43	5.68
67	0.43	0.44	0.43	0.30	0.33	0.32	1.02	1.06	1.04	1.14	1.27	1.21	5.16	6.39	5.75
68	0.44	0.44	0.44	0.32	0.35	0.34	1.01	1.03	1.02	1.20	1.49	1.36	5.33	6.78	5.99
69	0.44	0.45	0.45	0.31	0.37	0.34	1.02	1.03	1.02	1.42	1.63	1.54	5.59	7.00	6.18
70	0.42	0.43	0.43	0.24	0.29	0.26	1.02	1.04	1.03	1.52	1.69	1.61	5.89	7.27	6.40
71	0.43	0.44	0.43	0.25	0.27	0.26	1.05	1.06	1.05	1.76	1.98	1.87	6.24	7.65	6.87
72	0.42	0.43	0.43	0.21	0.24	0.23	1.04	1.07	1.05	1.99	2.19	2.10	6.47	8.00	6.91
73	1.18	1.46	1.31	2.68	3.61	3.11	2.42	2.93	2.65	2.99	3.34	3.15	3.98	5.41	4.57
74	0.41	0.42	0.41	0.15	0.17	0.16	1.03	1.04	1.03	2.15	2.25	2.21	6.67	8.35	7.09
75	0.42	0.43	0.42	0.17	0.19	0.18	1.05	1.07	1.06	2.33	2.39	2.36	6.78	8.59	7.32
76	0.41	0.42	0.42	0.08	0.09	0.08	1.04	1.06	1.06	2.09	2.14	2.12	7.01	8.64	7.41

RESTART DECK TAPE WAS LAST WRITTEN AFTER CYCLE 1201
HYDRAULIC CYCLE ON EXTRACT TAPE FOR RESTARTING = 174
NTAG = 5

THE TOTAL MASS (TONS) FOR EACH CONSTITUENT AT CYCLE 1201 IS AS FOLLOWS

8483195846656.00 3966669684736.00 25507391340544.00 118489371111552.00 108233779838976.00

THE TOTAL MASS (TONS) DEPLETED FOR EACH CONSTITUENT AS OF CYCLE 1201 IS AS FOLLOWS

0.0 0.0 0.0 6586933248.00 0.0

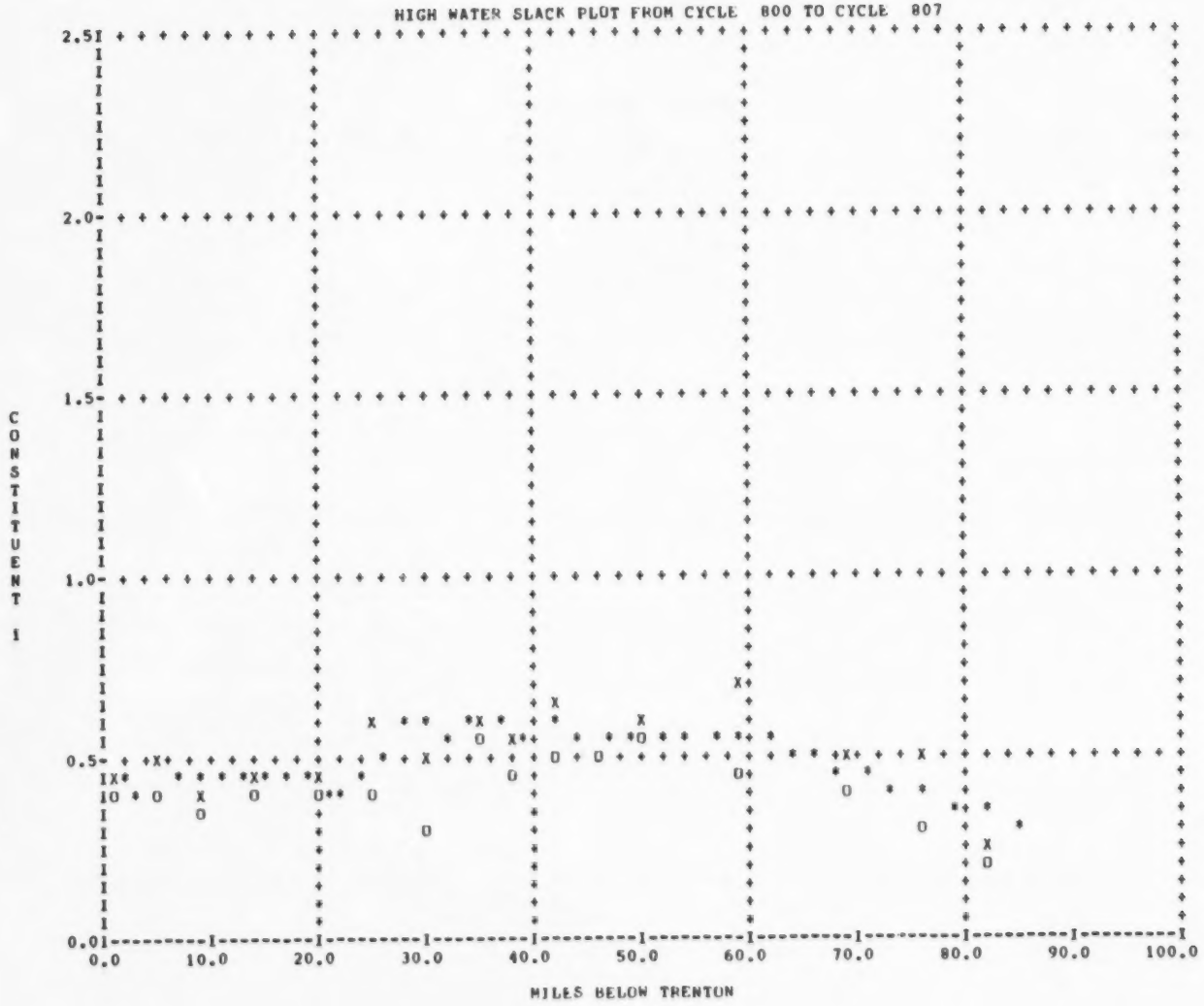
END OF QUALITY RUN. 1201 CYCLES.

THE FOLLOWING DEPLETION CORRECTIONS (MG/L * CU FT) WERE ACCUMULATED FOR CONSTITUENT 4

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
843995.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.				

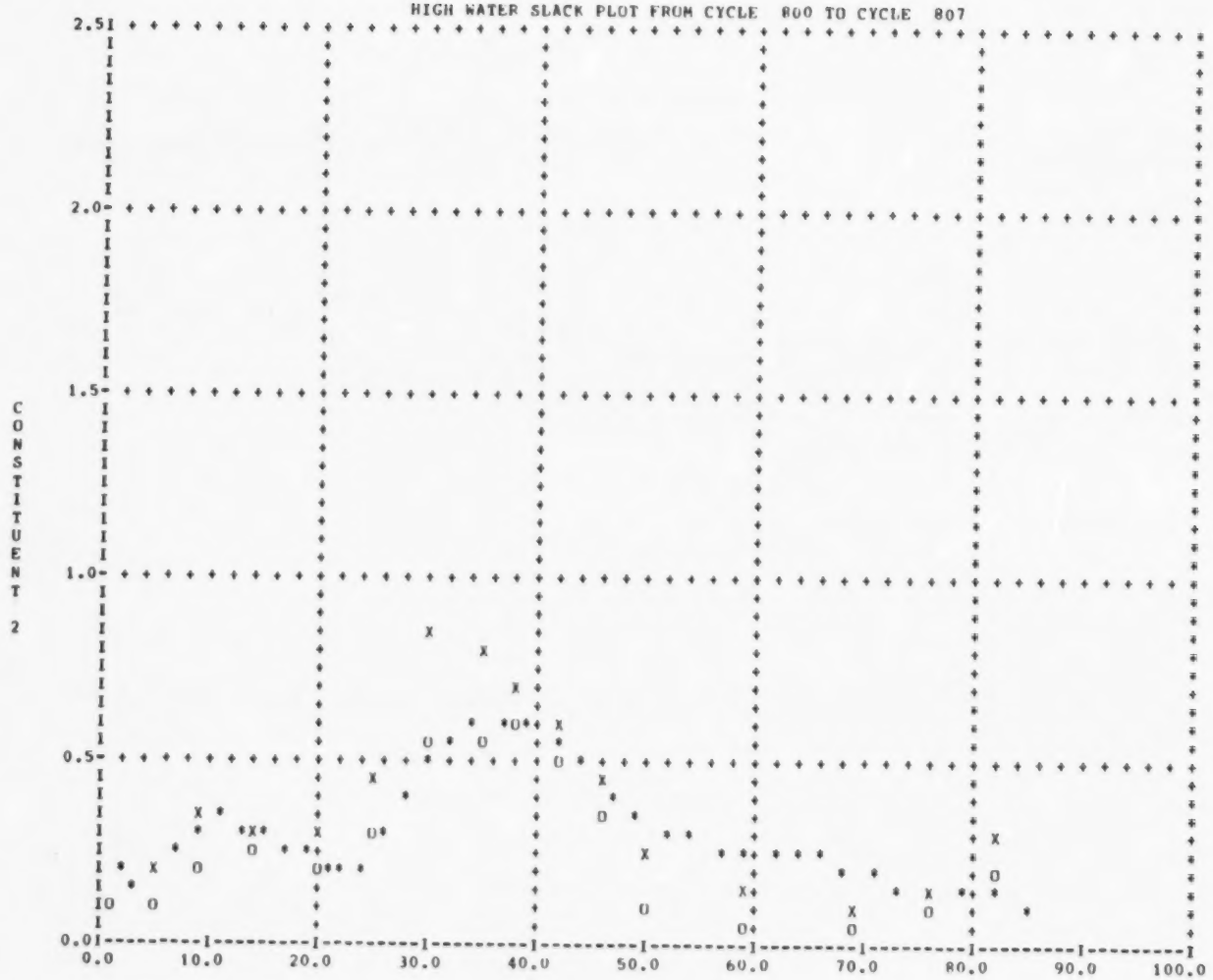
DELAWARE ESTUARY CENTER CHANNEL

HIGH WATER SLACK PLOT FROM CYCLE 800 TO CYCLE 807



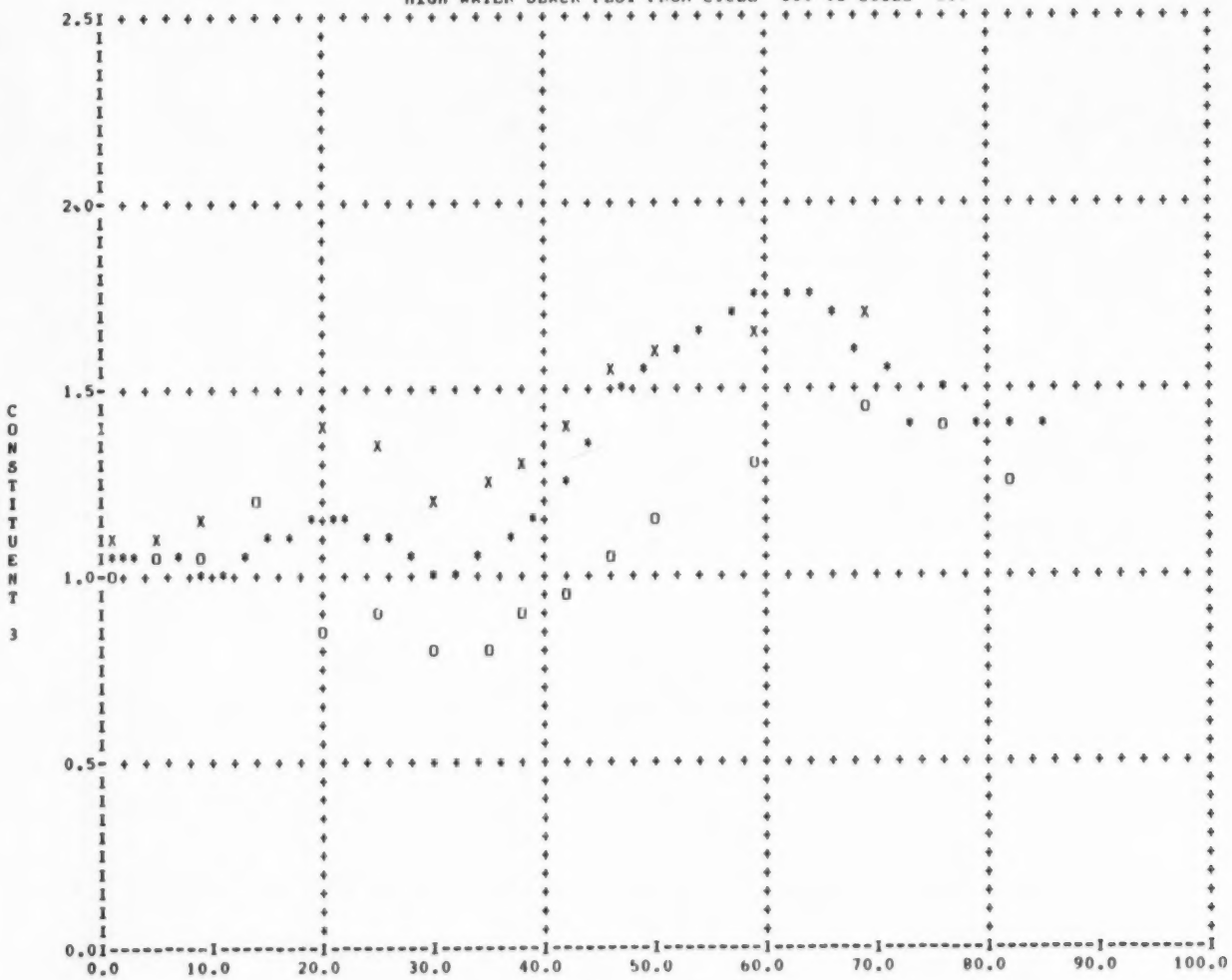
DELAWARE ESTUARY CENTER CHANNEL

HIGH WATER SLACK PLOT FROM CYCLE 800 TO CYCLE 807



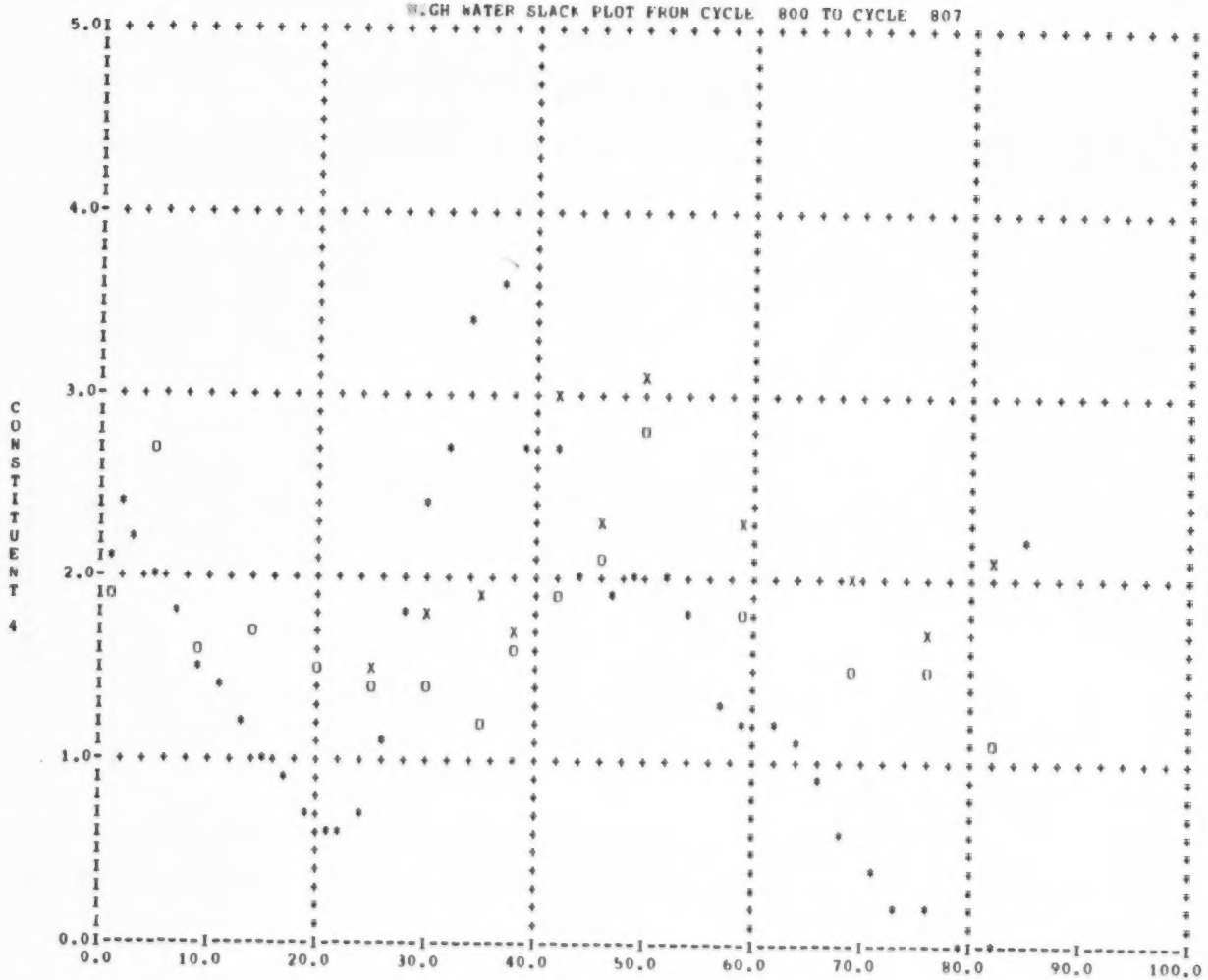
DELAWARE ESTUARY CENTER CHANNEL

HIGH WATER SLACK PLOT FROM CYCLE 800 TO CYCLE 807



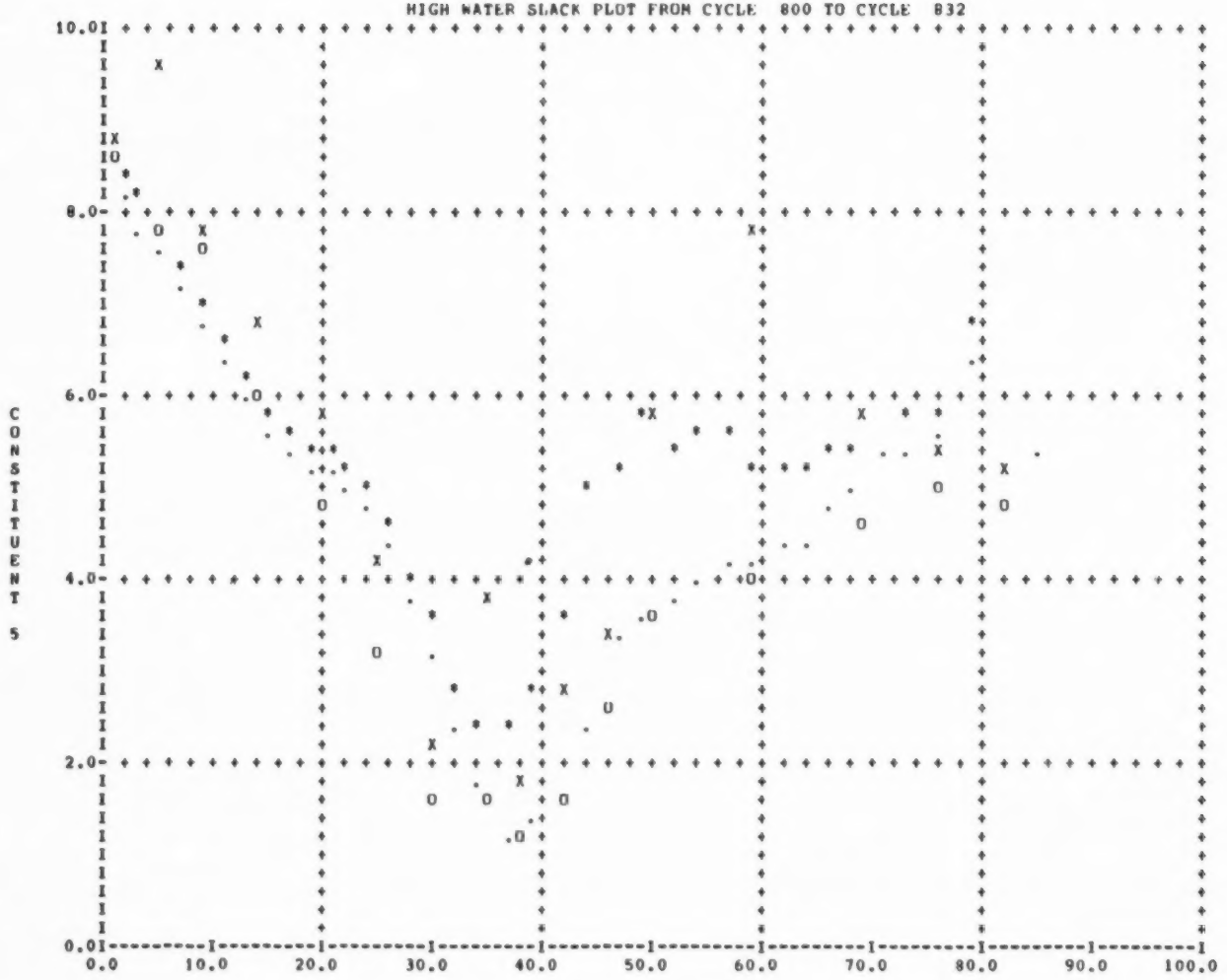
DELAWARE ESTUARY CENTER CHANNEL

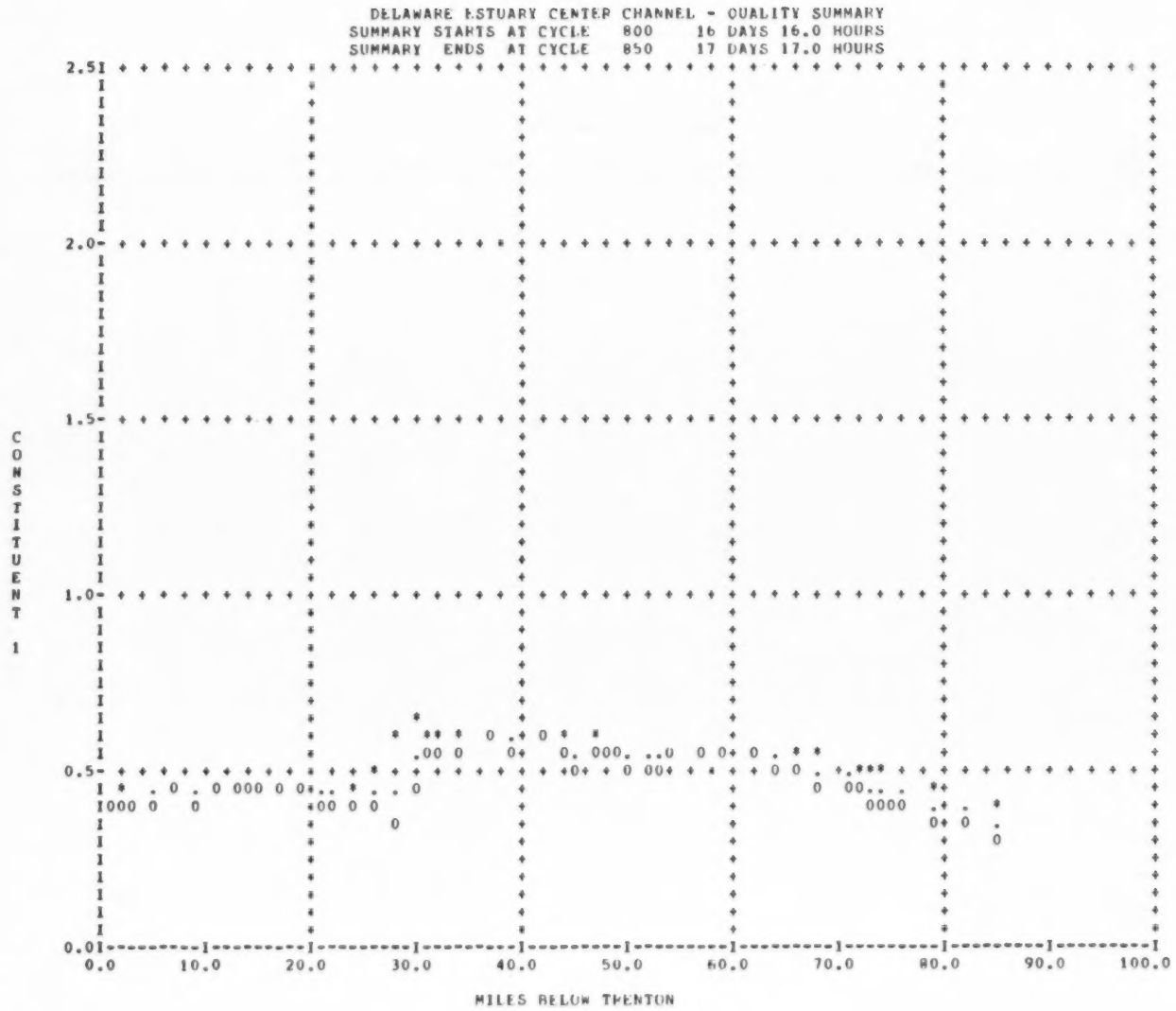
HIGH WATER SLACK PLOT FROM CYCLE 800 TO CYCLE 807

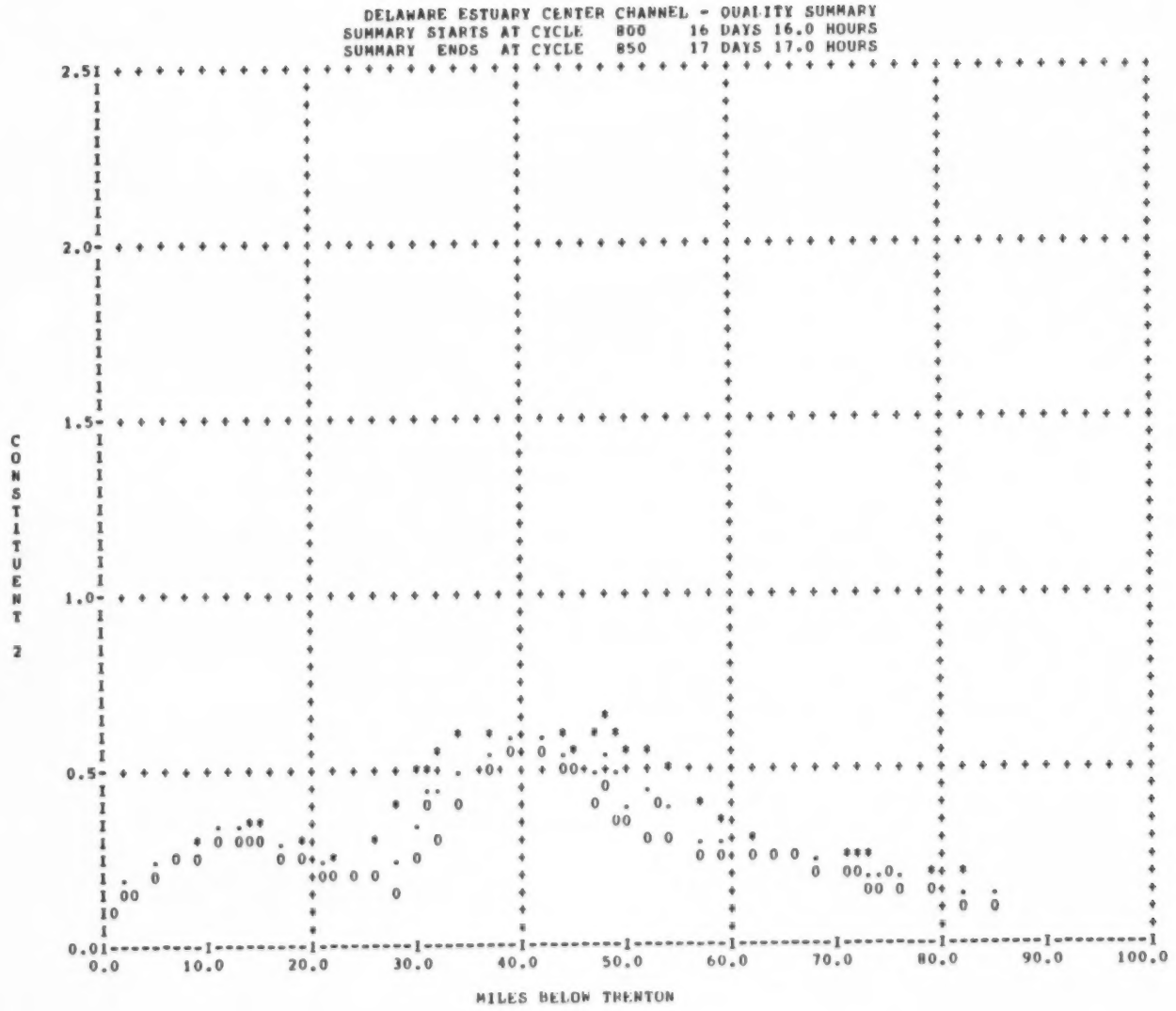


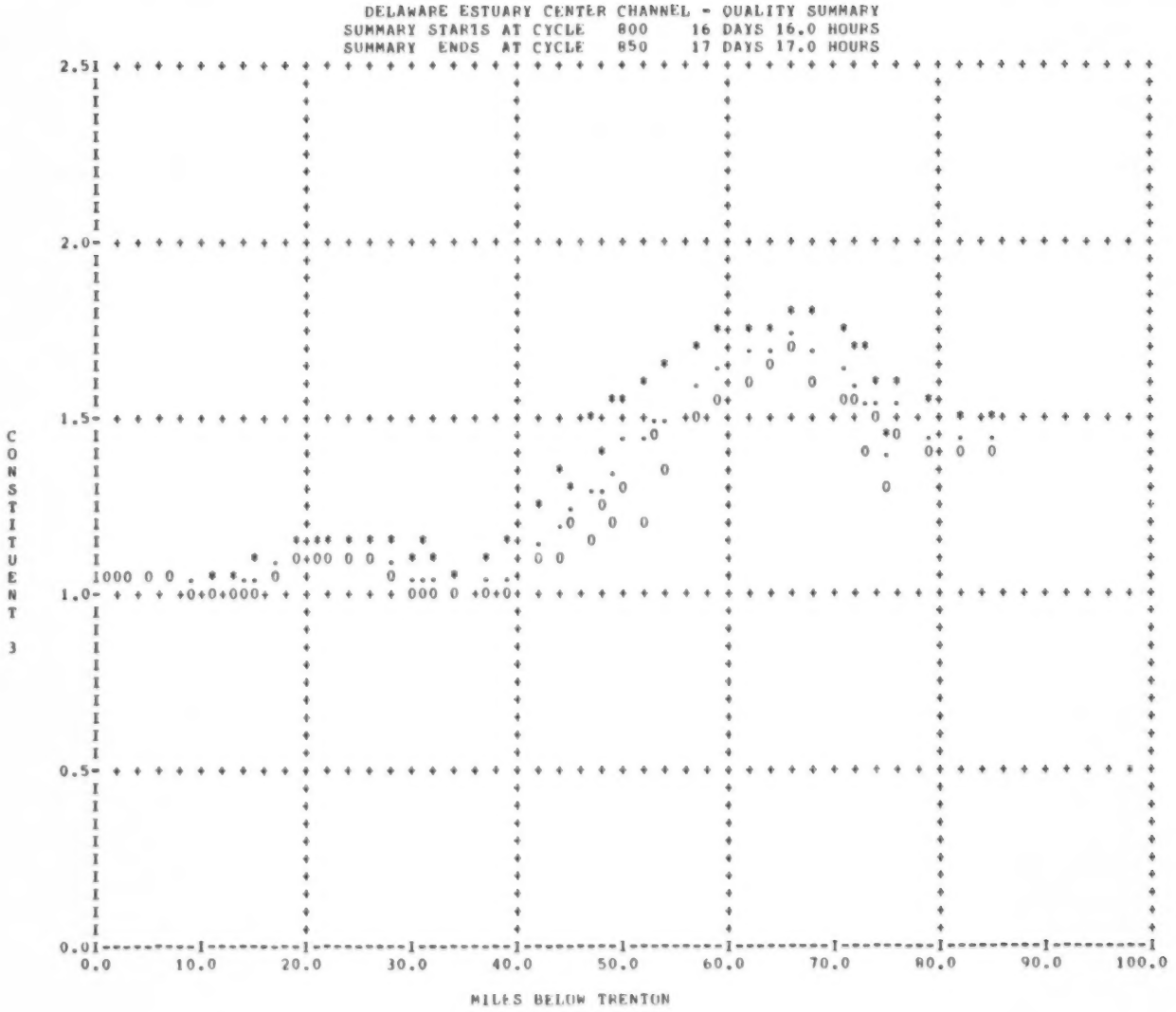
DELAWARE ESTUARY CENTER CHANNEL

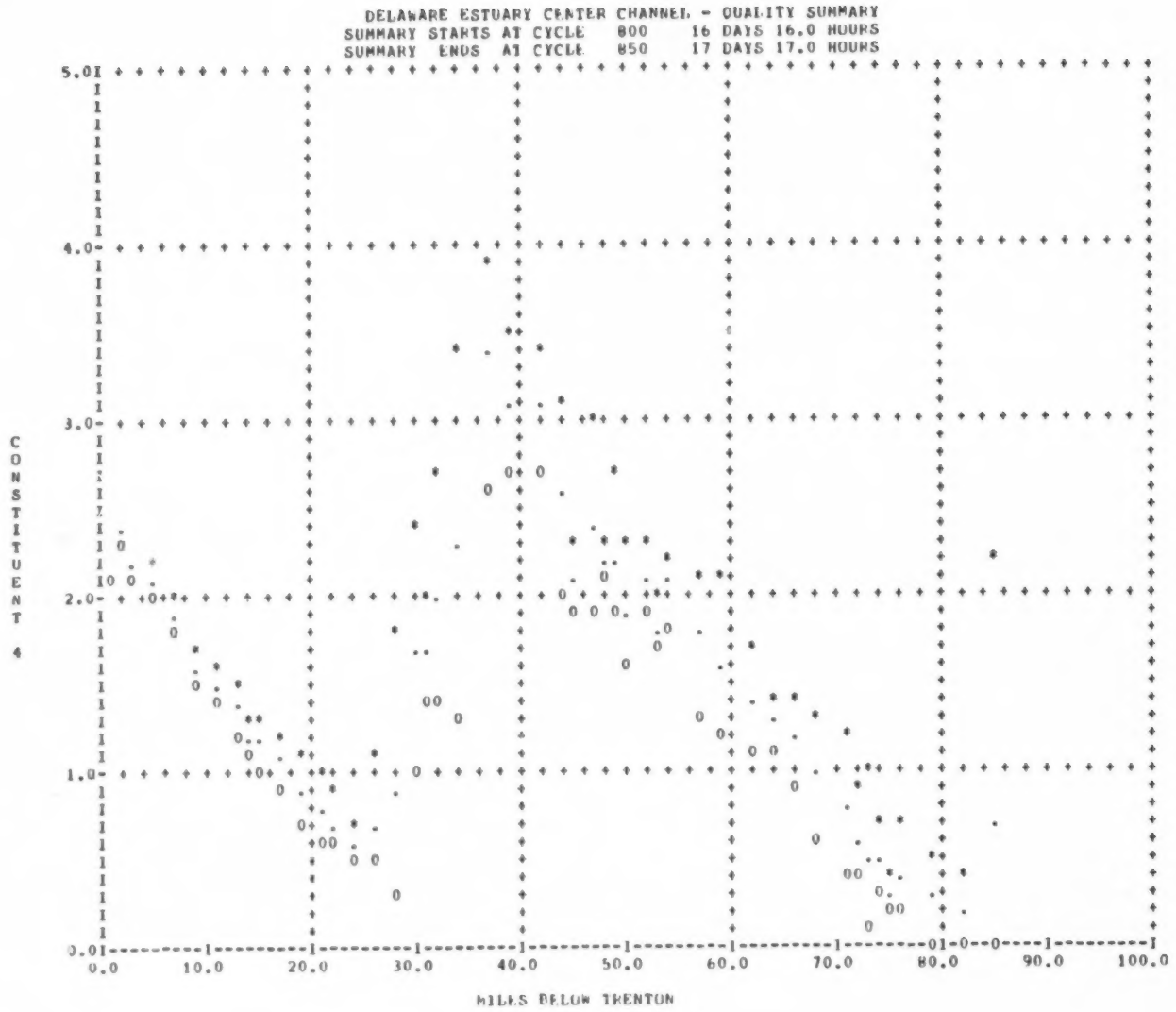
HIGH WATER SLACK PLOT FROM CYCLE 800 TO CYCLE 832

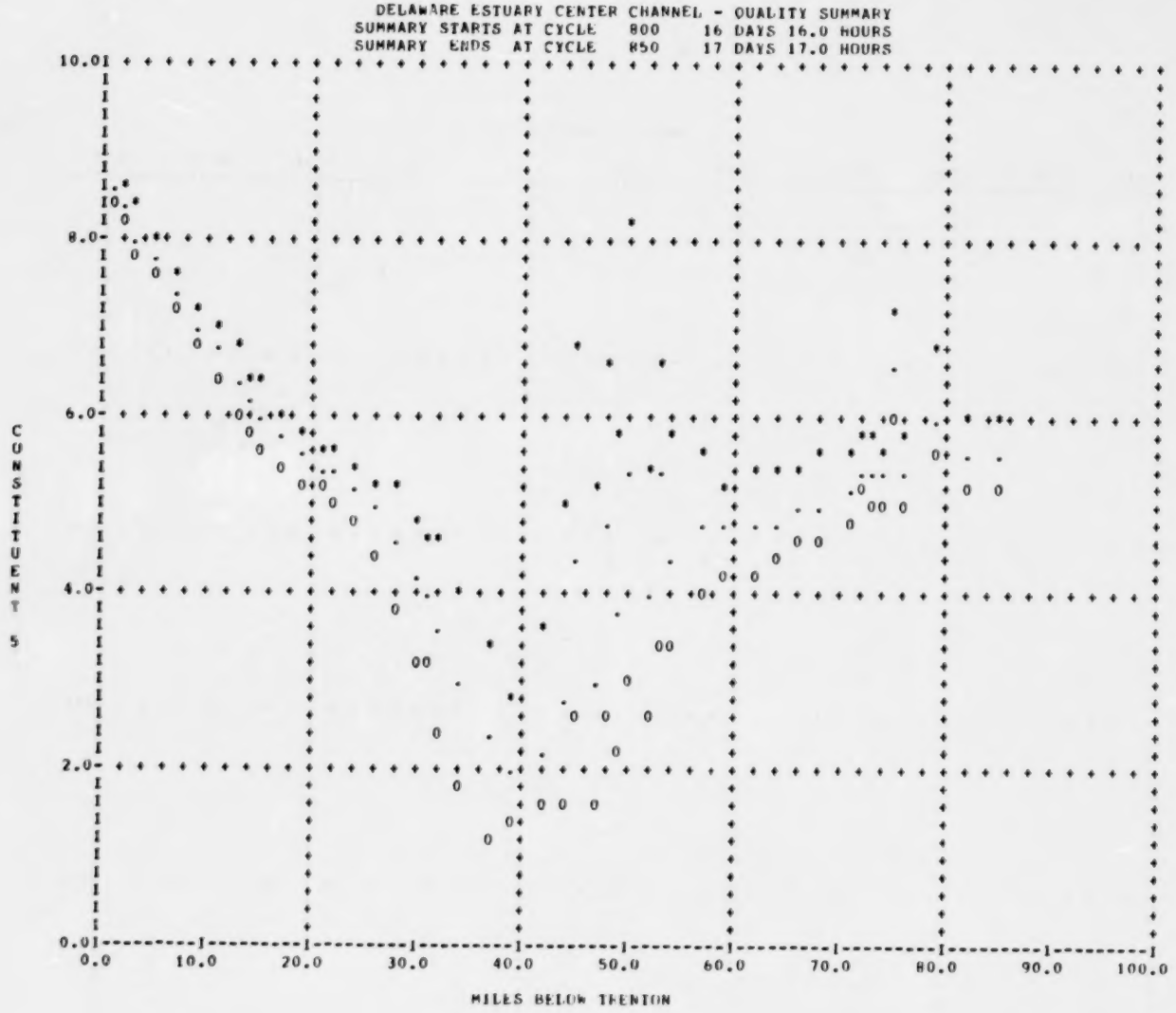



DELAWARE ESTUARY CENTER CHANNEL - QUALITY SUMMARY
SUMMARY STARTS AT CYCLE 800 16 DAYS 16.0 HOURS
SUMMARY ENDS AT CYCLE 850 17 DAYS 17.0 HOURS
CONSTITUENT 1
2.5
2.0
1.5
1.0
0.5
0.0
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
MILES BELOW TRENTON


DELAWARE ESTUARY CENTER CHANNEL - QUALITY SUMMARY
SUMMARY STARTS AT CYCLE 800 16 DAYS 16.0 HOURS
SUMMARY ENDS AT CYCLE 850 17 DAYS 17.0 HOURS
CONSTITUENT 2
2.5
2.0
1.5
1.0
0.5
0.0
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
MILES BELOW TRENTON

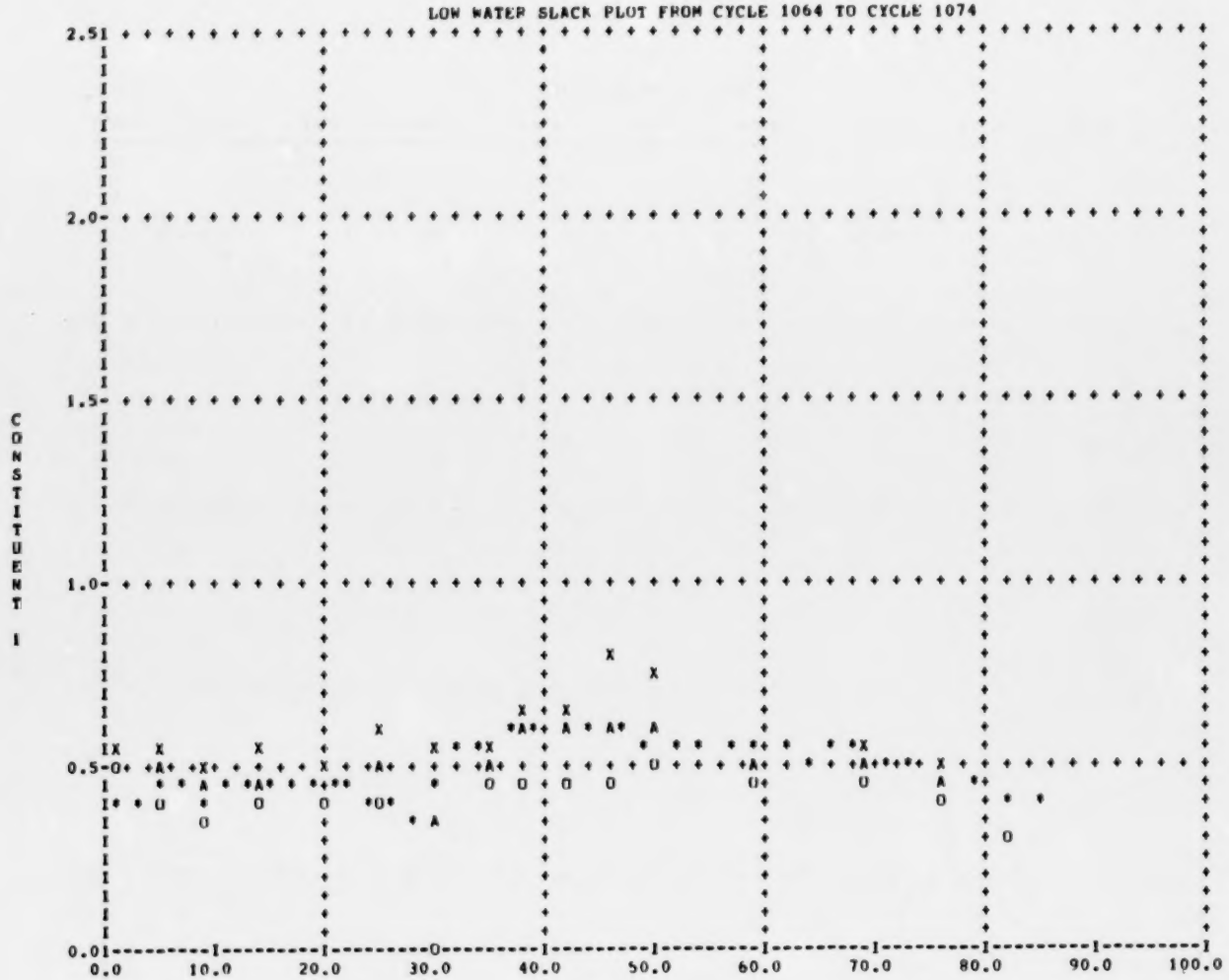

DELAWARE ESTUARY CENTER CHANNEL - QUALITY SUMMARY
SUMMARY STARTS AT CYCLE 800 16 DAYS 16.0 HOURS
SUMMARY ENDS AT CYCLE 850 17 DAYS 17.0 HOURS
CONSTITUENT 3
2.5
2.0
1.5
1.0
0.5
0.0
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
MILES BELOW TRENTON


DELAWARE ESTUARY CENTER CHANNEL - QUALITY SUMMARY
SUMMARY STARTS AT CYCLE 800 16 DAYS 16.0 HOURS
SUMMARY ENDS AT CYCLE 850 17 DAYS 17.0 HOURS
CONSTITUENT 4
5.0
4.0
3.0
2.0
1.0
0.0
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
MILES BELOW TRENTON


DELAWARE ESTUARY CENTER CHANNEL - QUALITY SUMMARY
SUMMARY STARTS AT CYCLE 800 16 DAYS 16.0 HOURS
SUMMARY ENDS AT CYCLE 850 17 DAYS 17.0 HOURS
CONSTITUENT 5
MILES BELOW TRENTON
10.0
8.0
6.0
4.0
2.0
0.0
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0

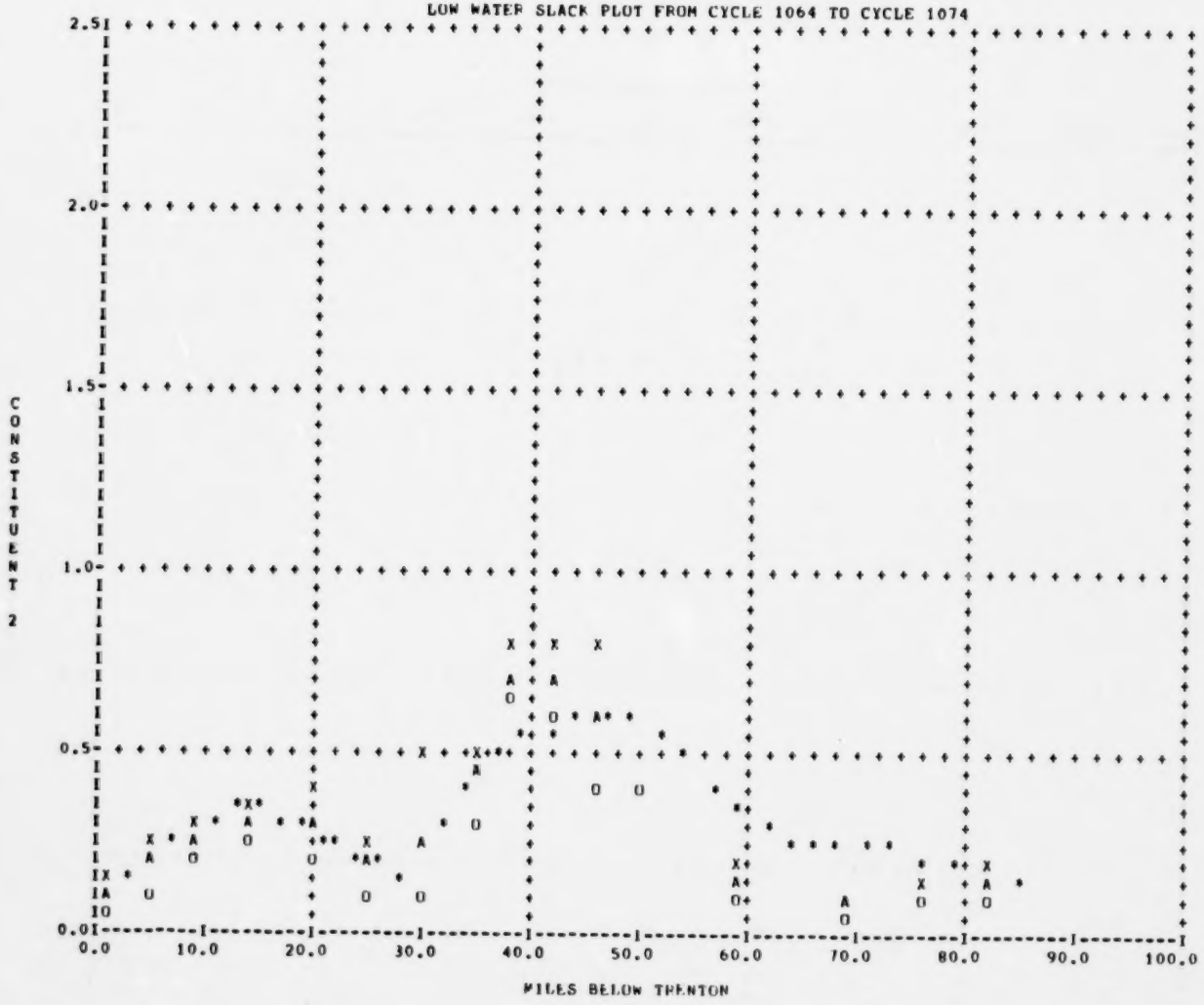
DELAWARE ESTUARY CENTER CHANNEL

LOW WATER SLACK PLOT FROM CYCLE 1064 TO CYCLE 1074



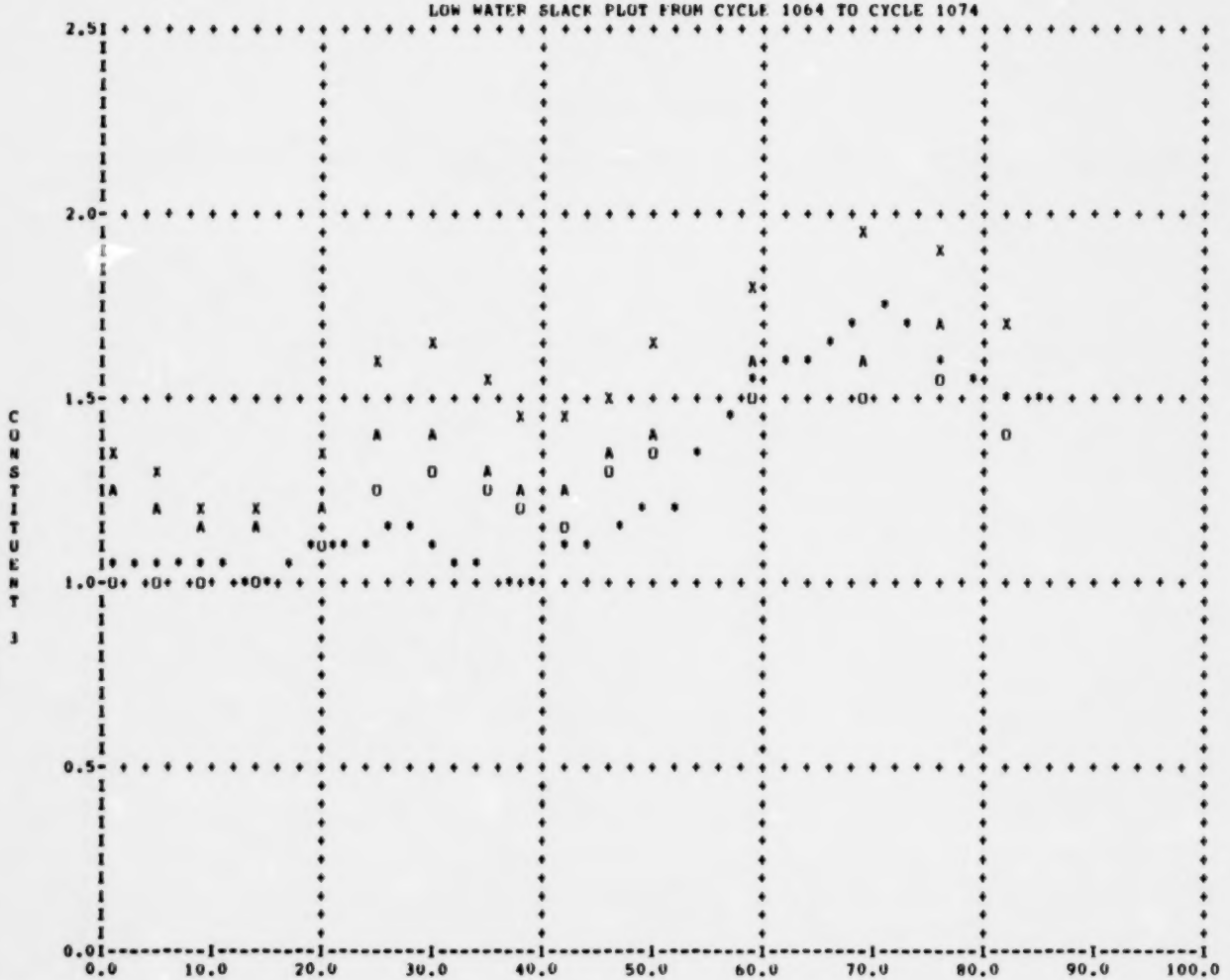
DELAWARE ESTUARY CENTER CHANNEL

LOW WATER SLACK PLOT FROM CYCLE 1064 TO CYCLE 1074



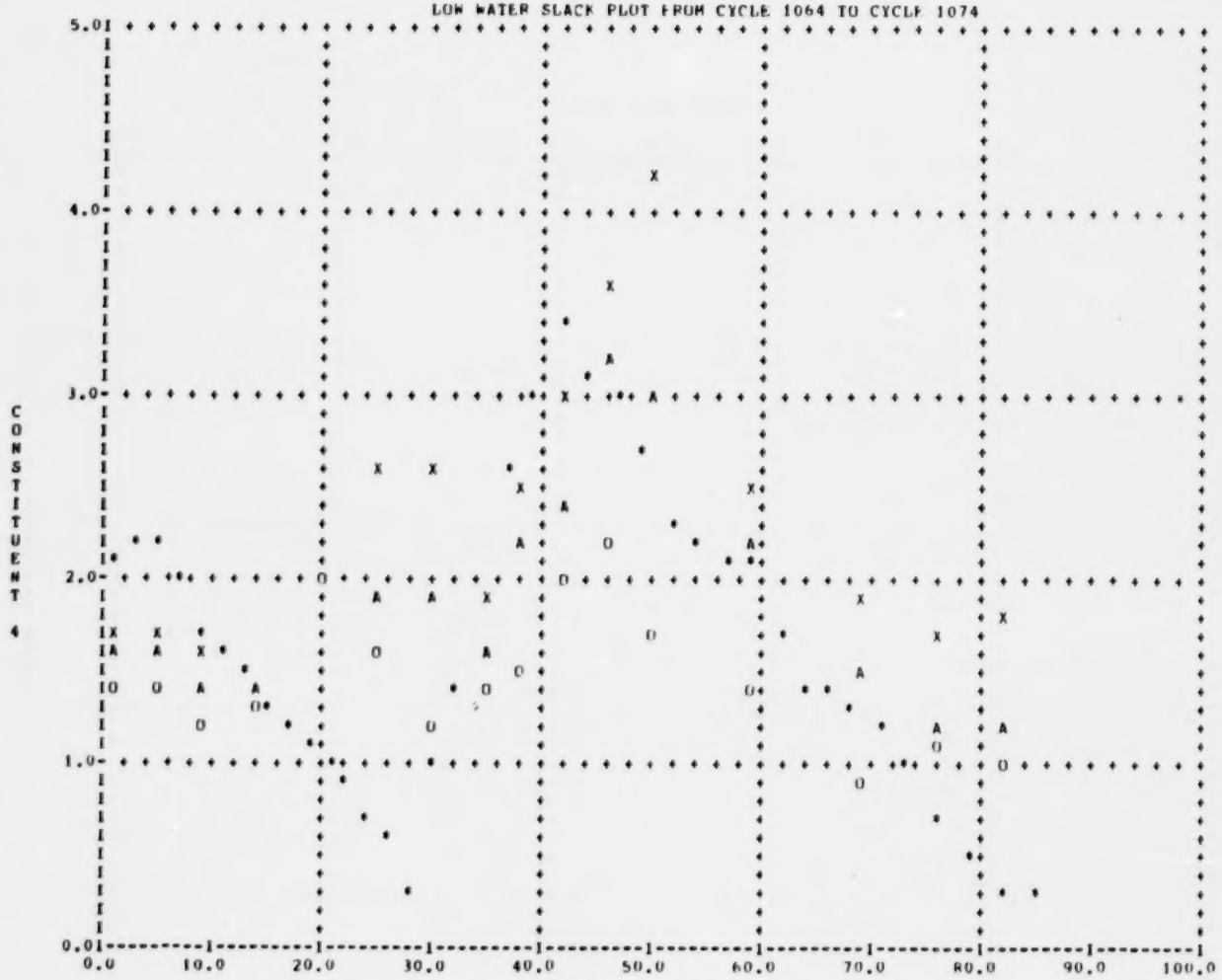
DELAWARE ESTUARY CENTER CHANNEL

LOW WATER SLACK PLOT FROM CYCLE 1064 TO CYCLE 1074



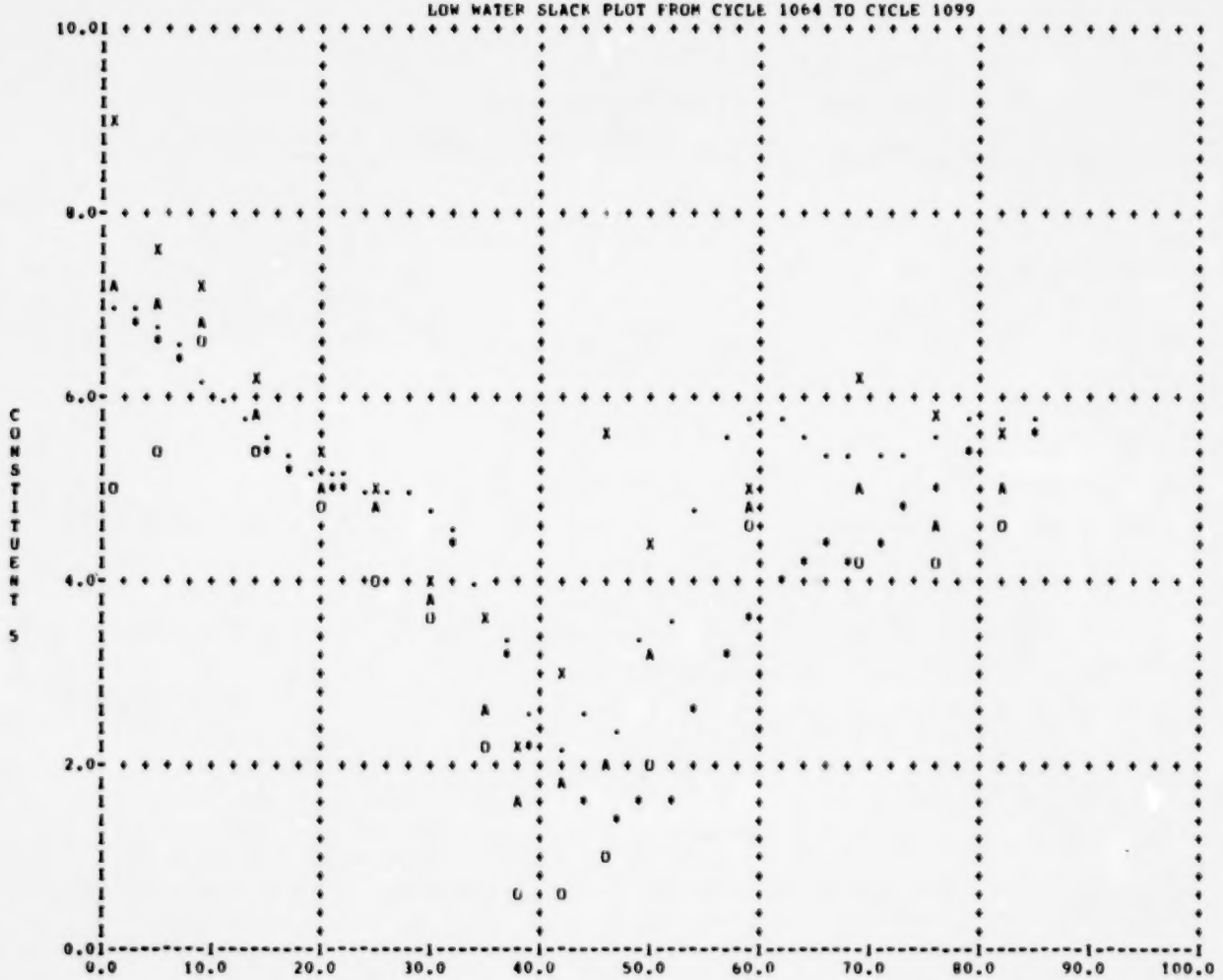
DELAWARE ESTUARY CENTER CHANNEL

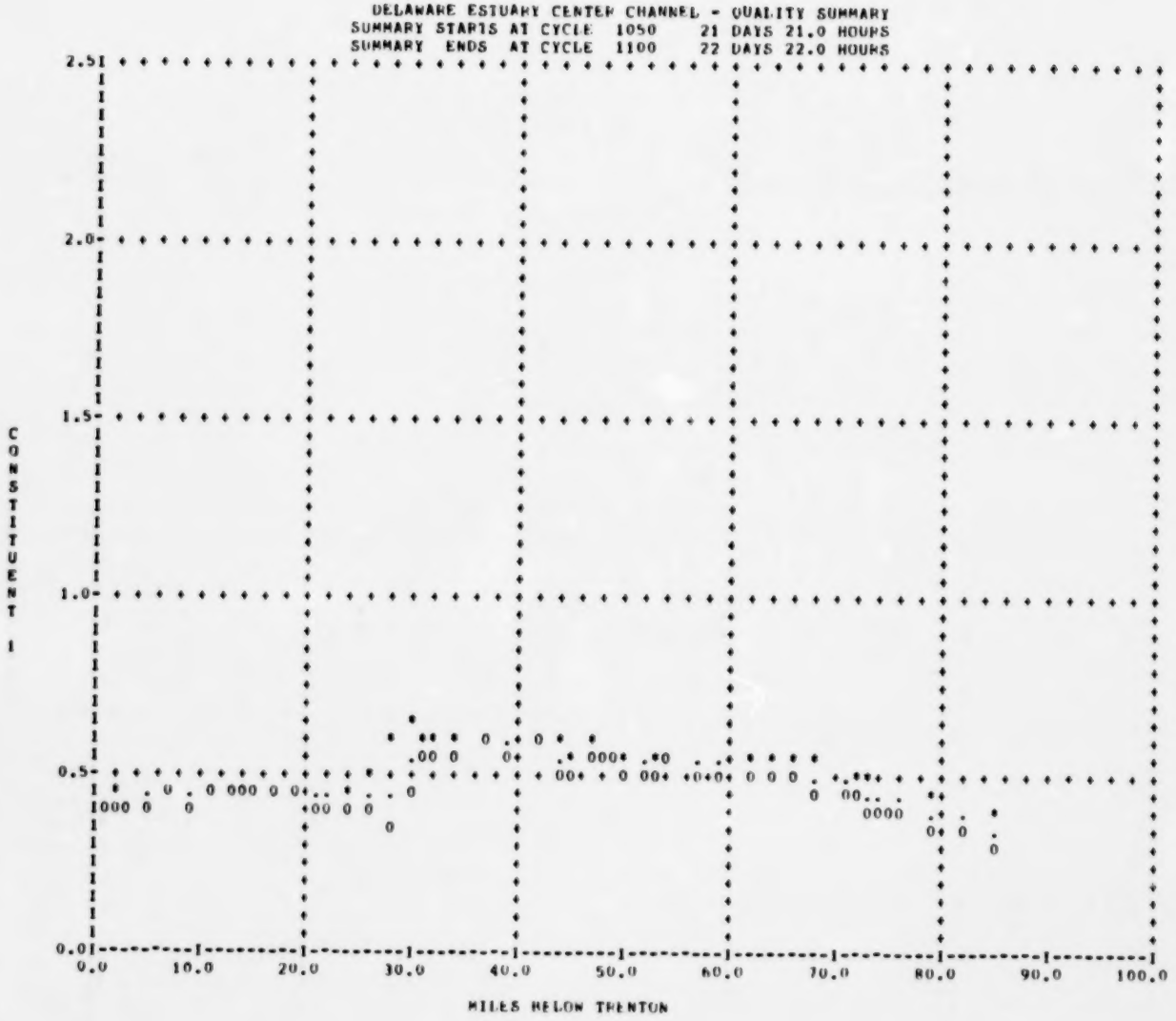
LOW WATER SLACK PLOT FROM CYCLE 1064 TO CYCLE 1074

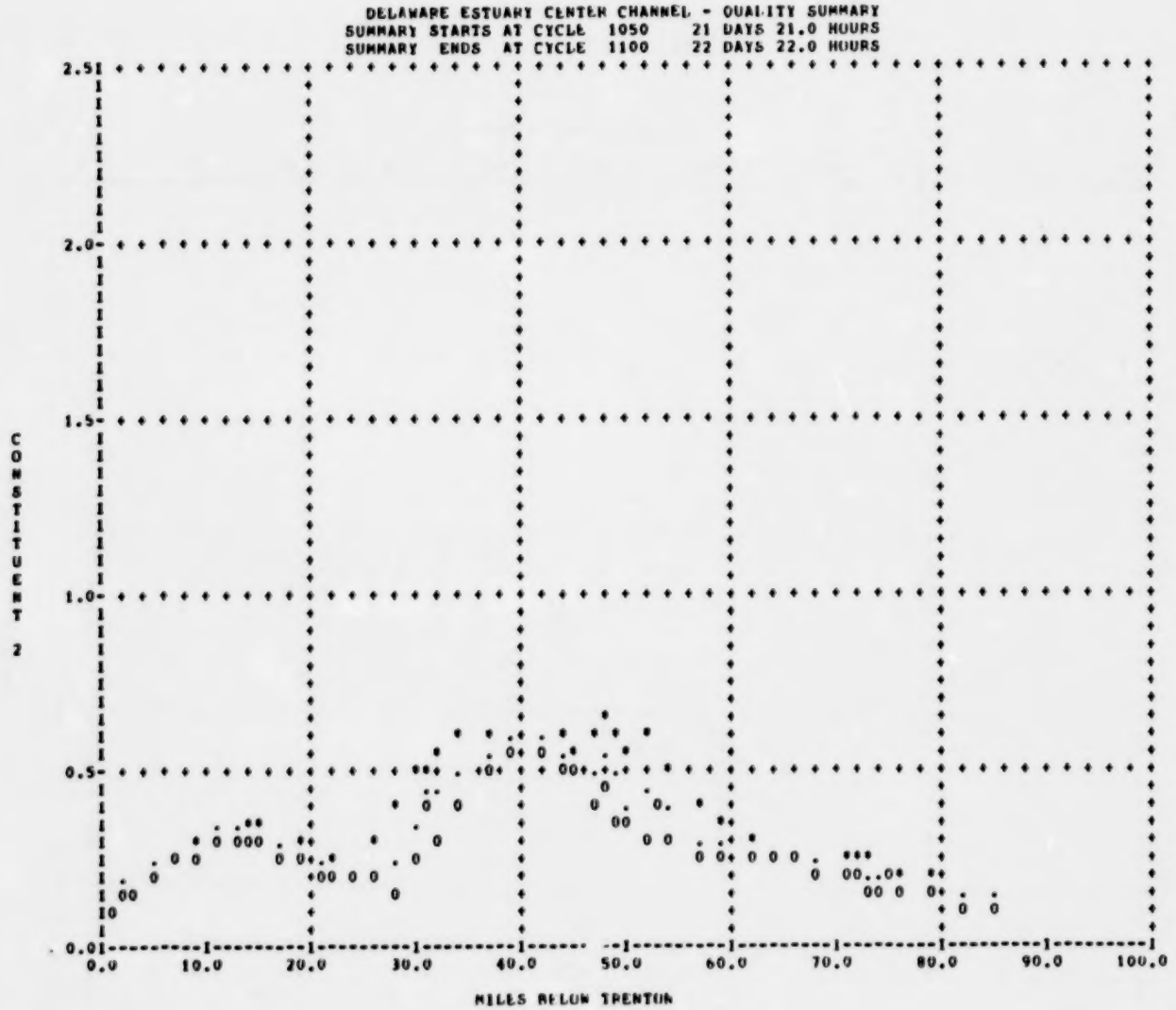


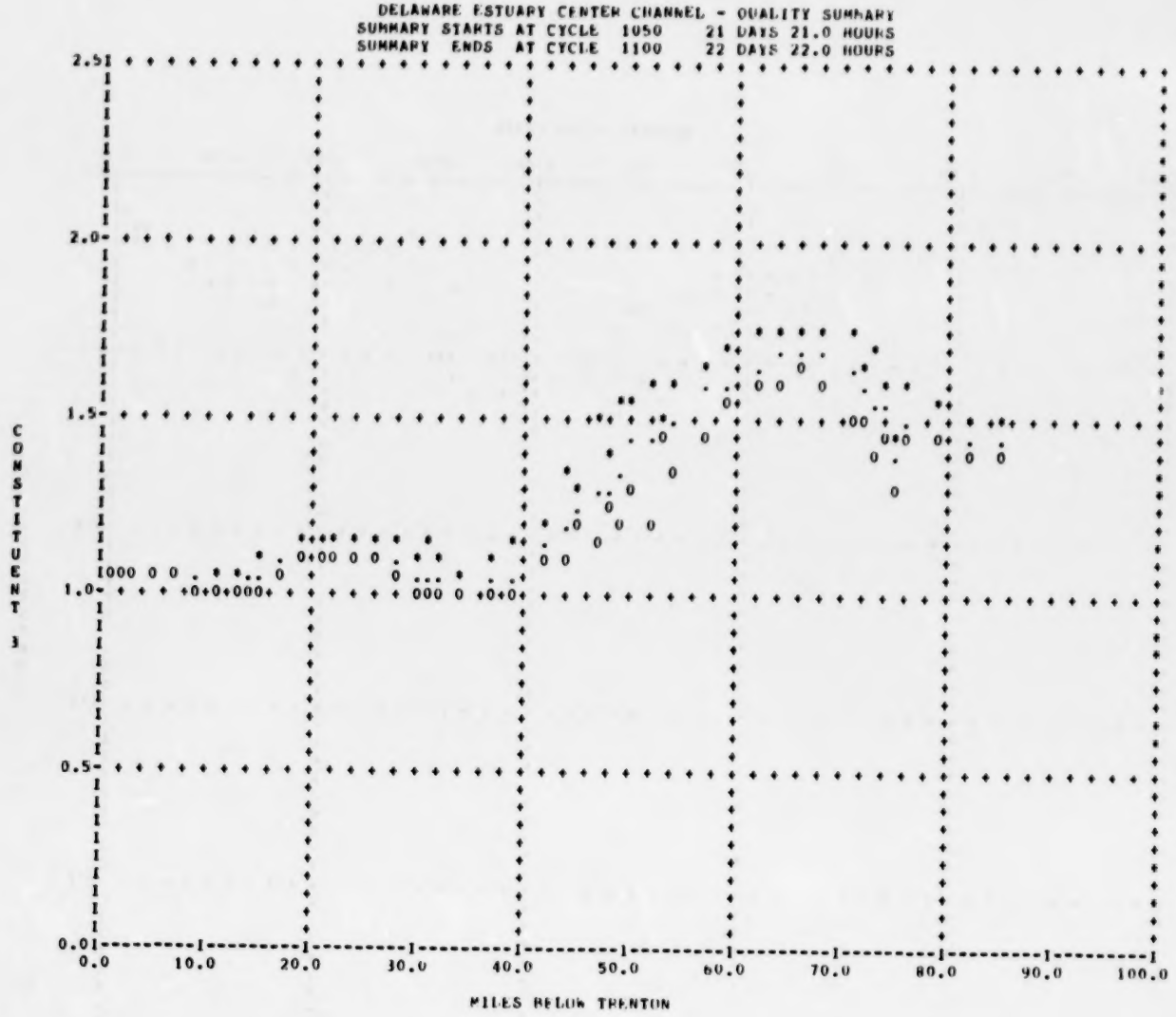
DELAWARE ESTUARY CENTER CHANNEL

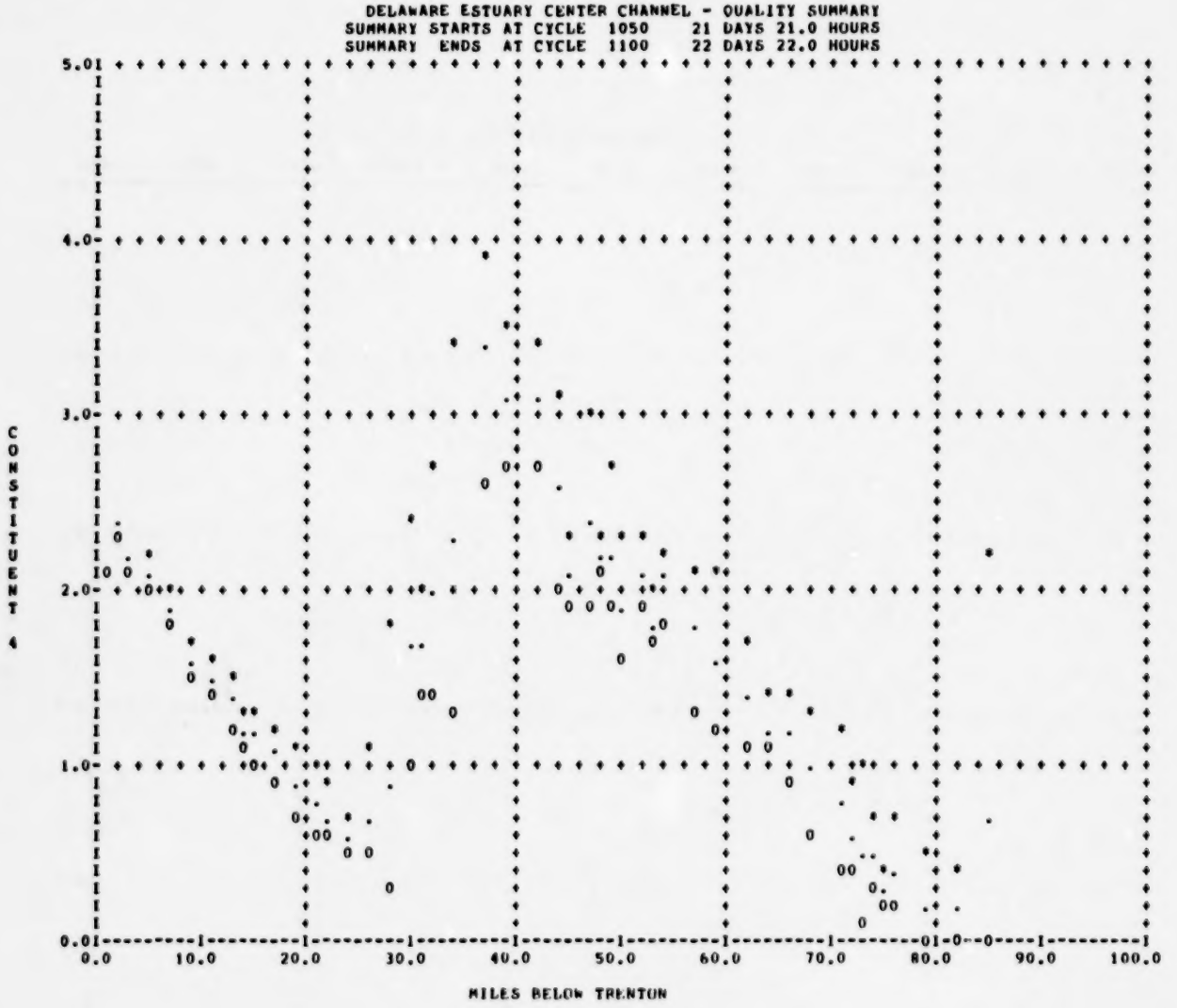
LOW WATER SLACK PLOT FROM CYCLE 1064 TO CYCLE 1099

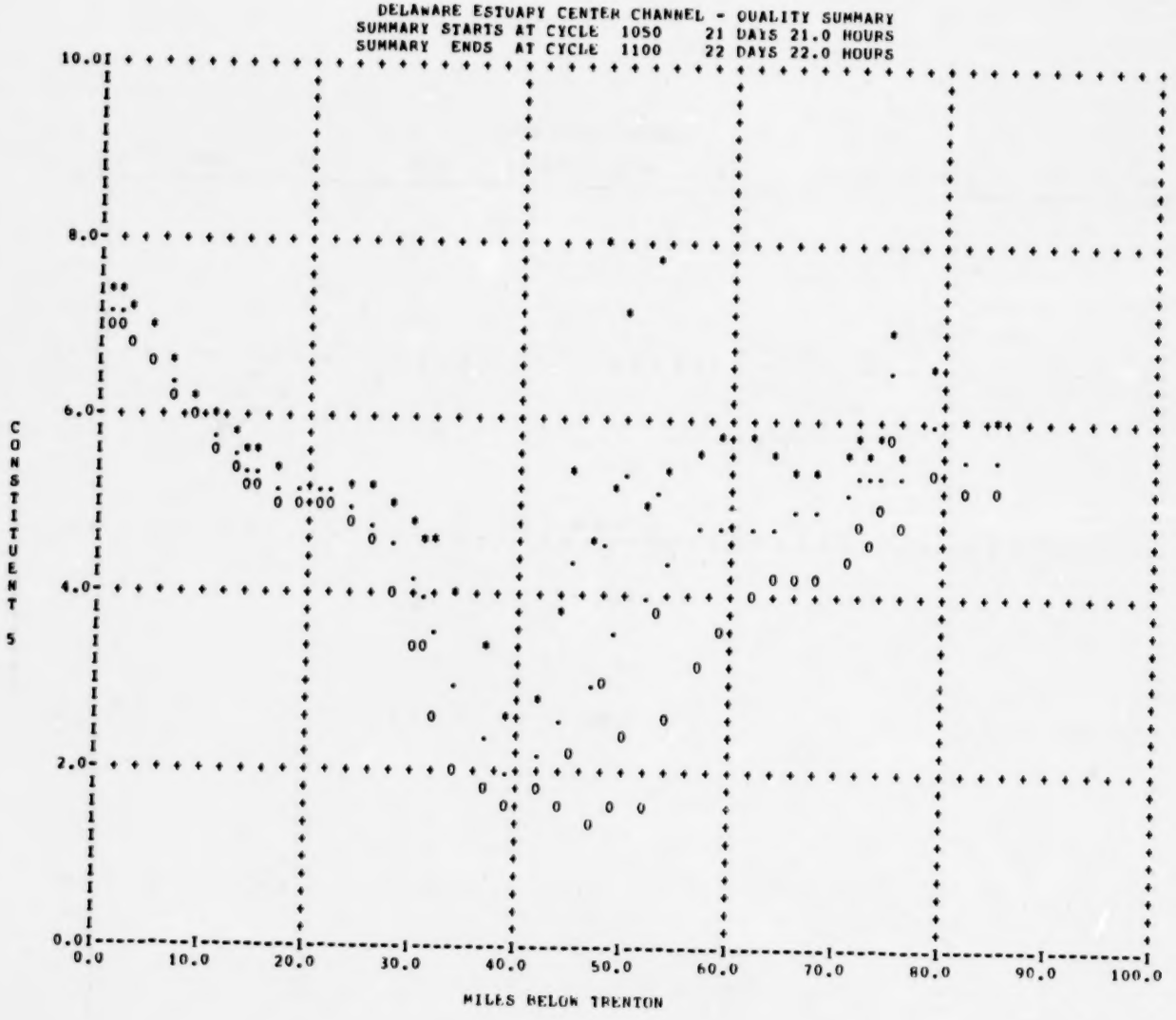


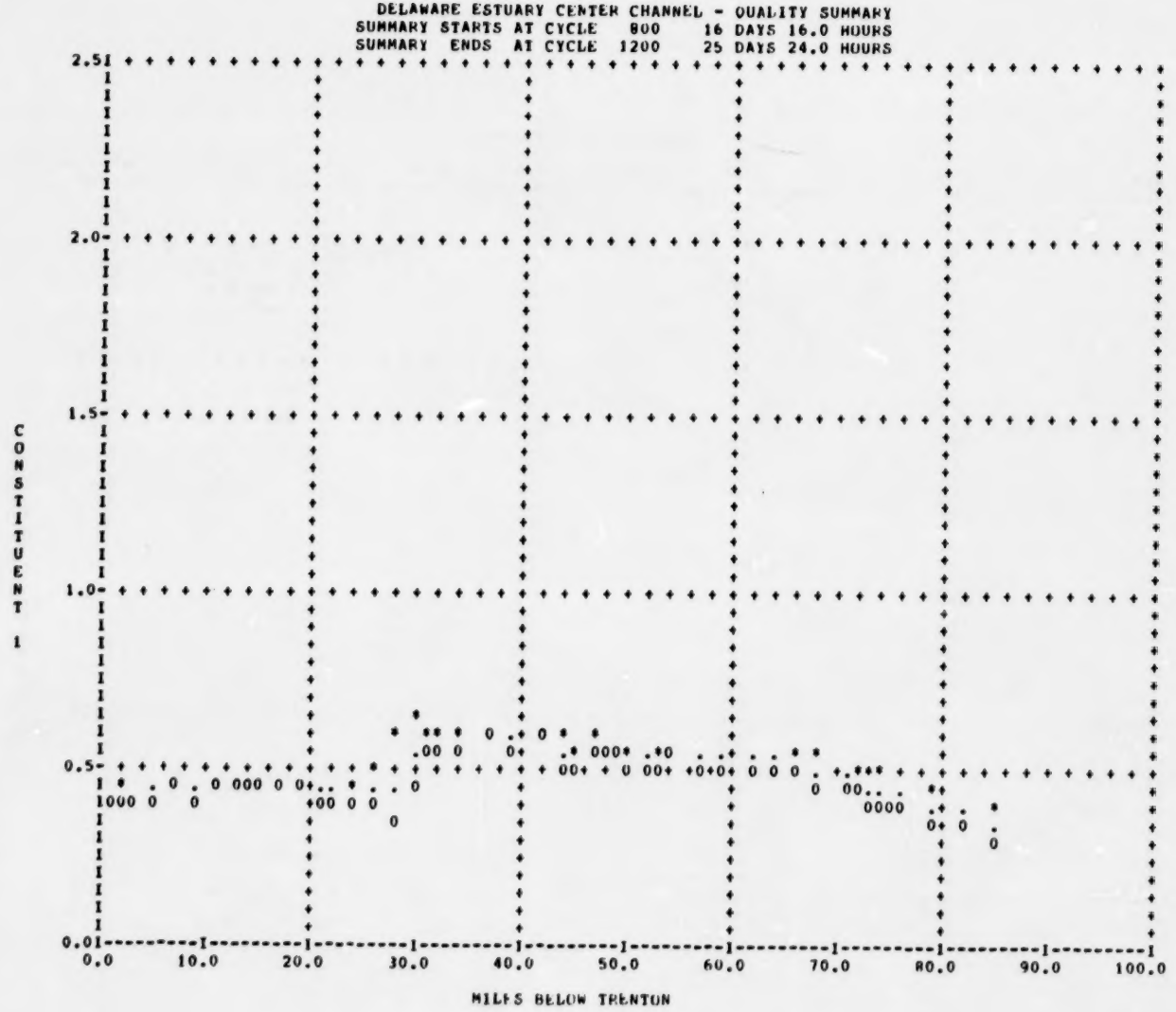

DELAWARE ESTUARY CENTER CHANNEL - QUALITY SUMMARY
SUMMARY STARTS AT CYCLE 1050 21 DAYS 21.0 HOURS
SUMMARY ENDS AT CYCLE 1100 22 DAYS 22.0 HOURS
CONSTITUENT 1
2.5
2.0
1.5
1.0
0.5
0.0
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
MILES BELOW TRENTON

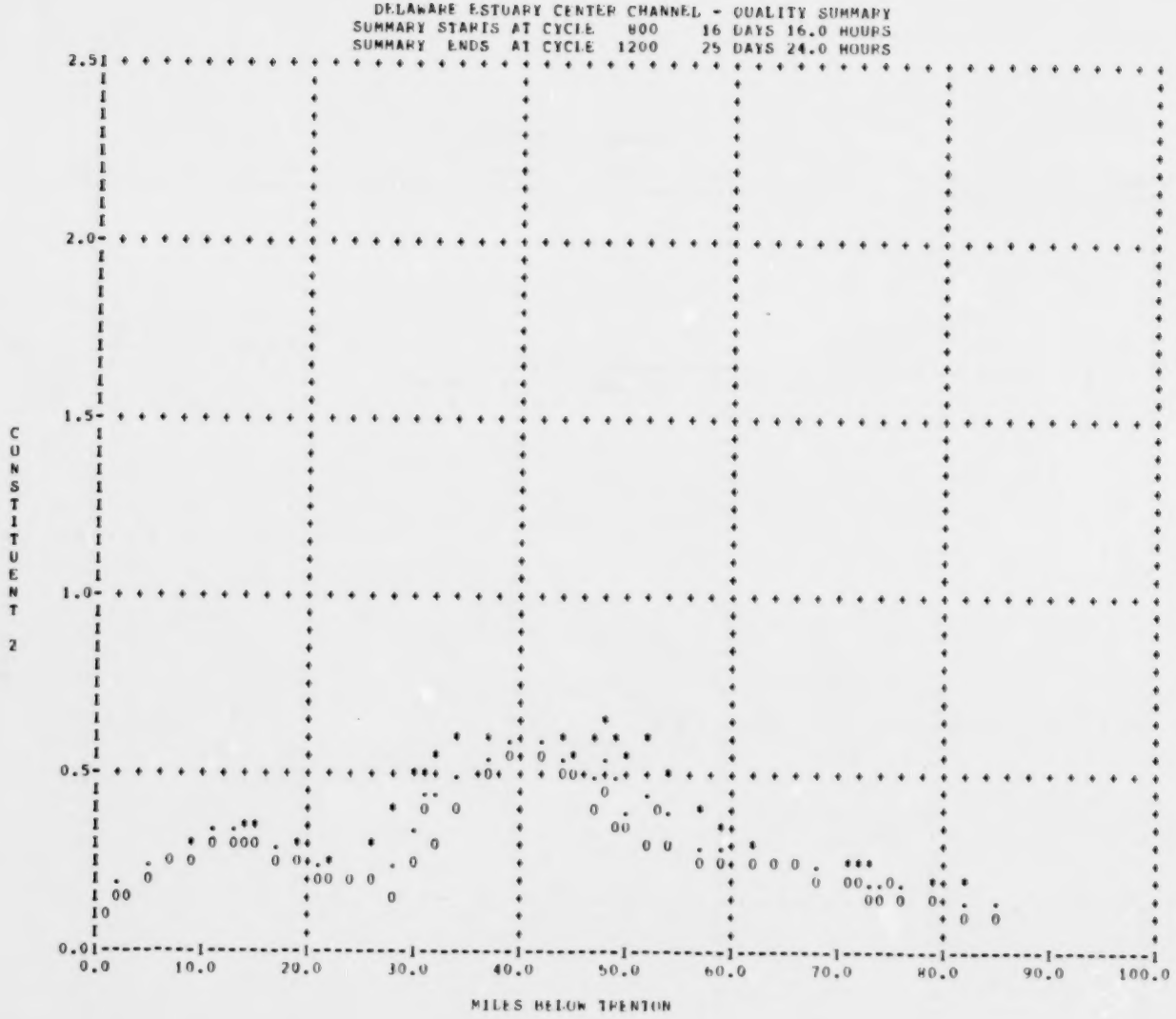

DELAWARE ESTUARY CENTER CHANNEL - QUALITY SUMMARY
SUMMARY STARTS AT CYCLE 1050 21 DAYS 21.0 HOURS
SUMMARY ENDS AT CYCLE 1100 22 DAYS 22.0 HOURS
CONSTITUENT 2
2.5
2.0
1.5
1.0
0.5
0.0
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
MILES BELOW TRENTON

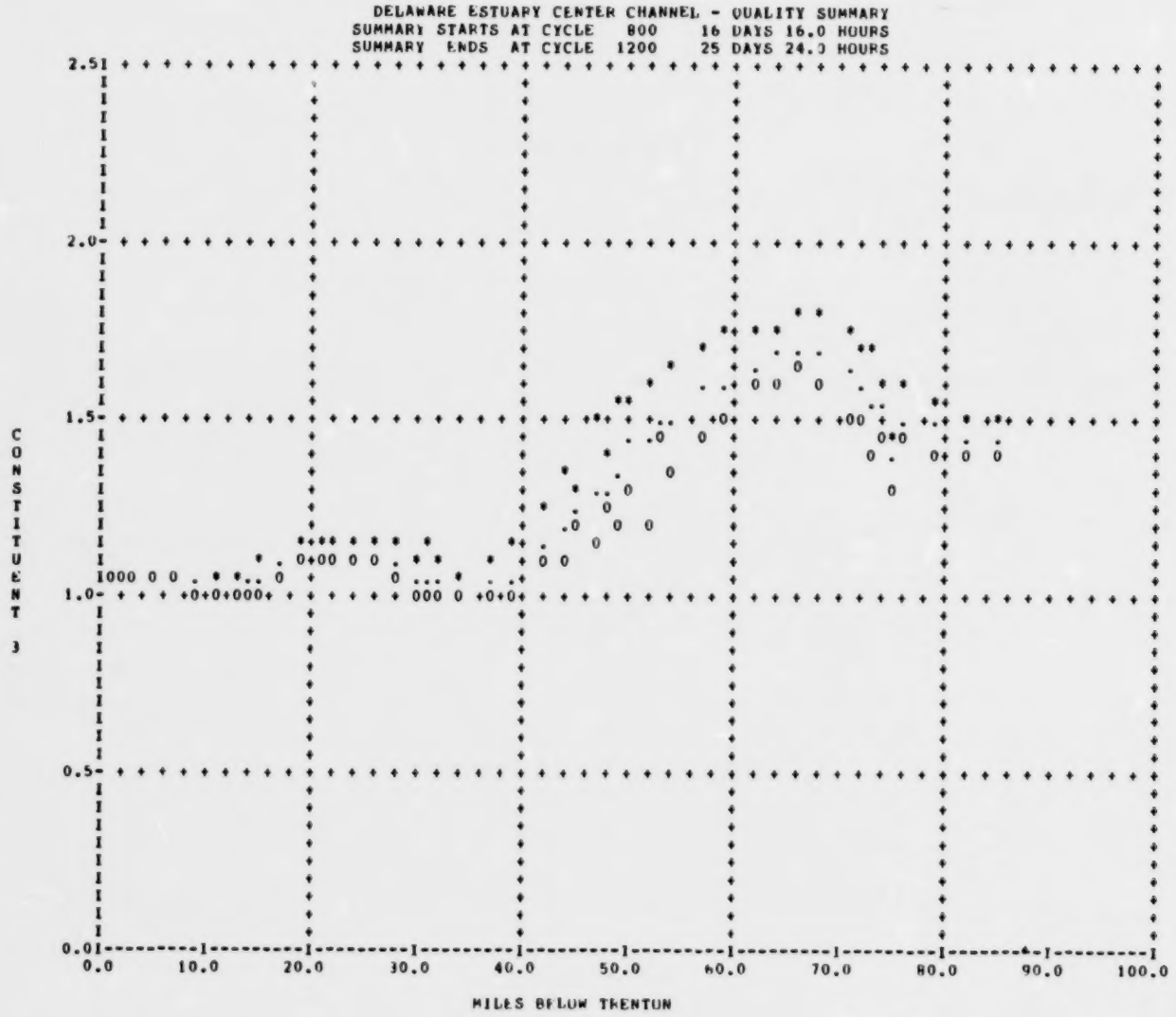

DELAWARE ESTUARY CENTER CHANNEL - QUALITY SUMMARY
SUMMARY STARTS AT CYCLE 1050 21 DAYS 21.0 HOURS
SUMMARY ENDS AT CYCLE 1100 22 DAYS 22.0 HOURS
CONSTITUENT 3
2.5
2.0
1.5
1.0
0.5
0.01
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
MILES BELOW TRENTON

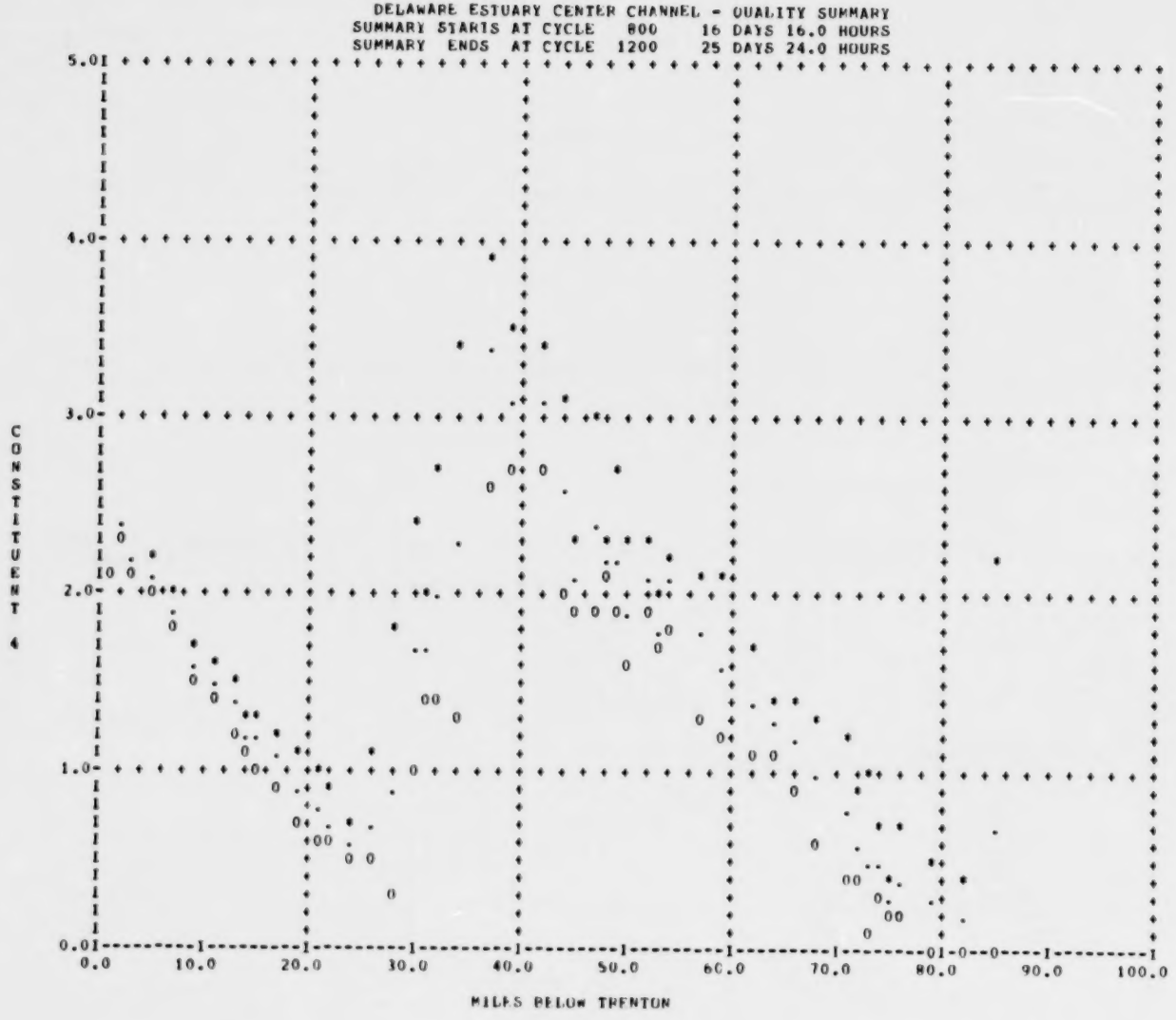

DELAWARE ESTUARY CENTER CHANNEL - QUALITY SUMMARY
SUMMARY STARTS AT CYCLE 1050 21 DAYS 21.0 HOURS
SUMMARY ENDS AT CYCLE 1100 22 DAYS 22.0 HOURS
CONSTITUENT 4
5.0
4.0
3.0
2.0
1.0
0.0
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
MILES BELOW TRENTON

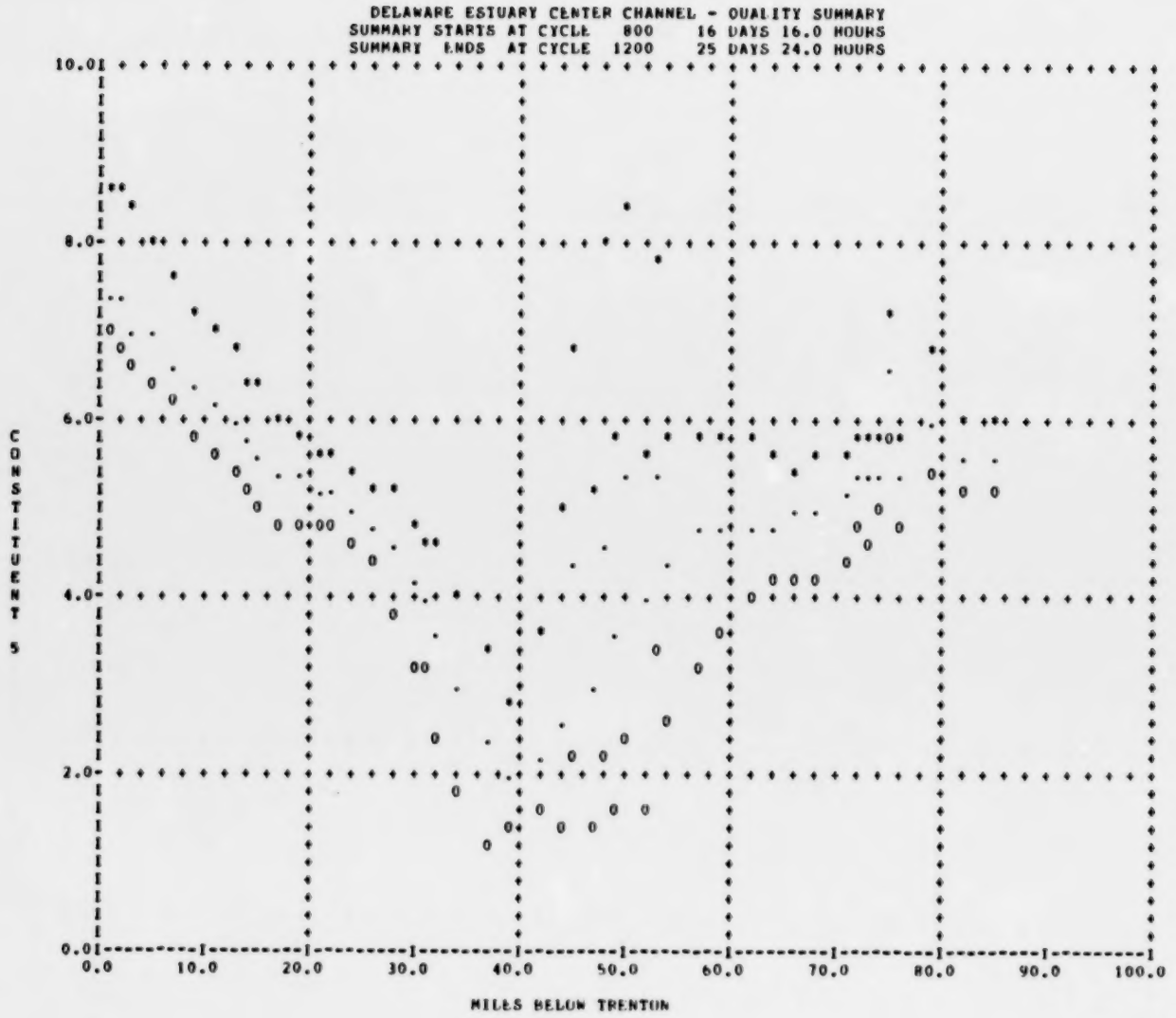

DELAWARE ESTUARY CENTER CHANNEL - QUALITY SUMMARY
SUMMARY STARTS AT CYCLE 1050 21 DAYS 21.0 HOURS
SUMMARY ENDS AT CYCLE 1100 22 DAYS 22.0 HOURS
CONSTITUENT 5
10.0
8.0
6.0
4.0
2.0
0.0
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
MILES BELOW TRENTON

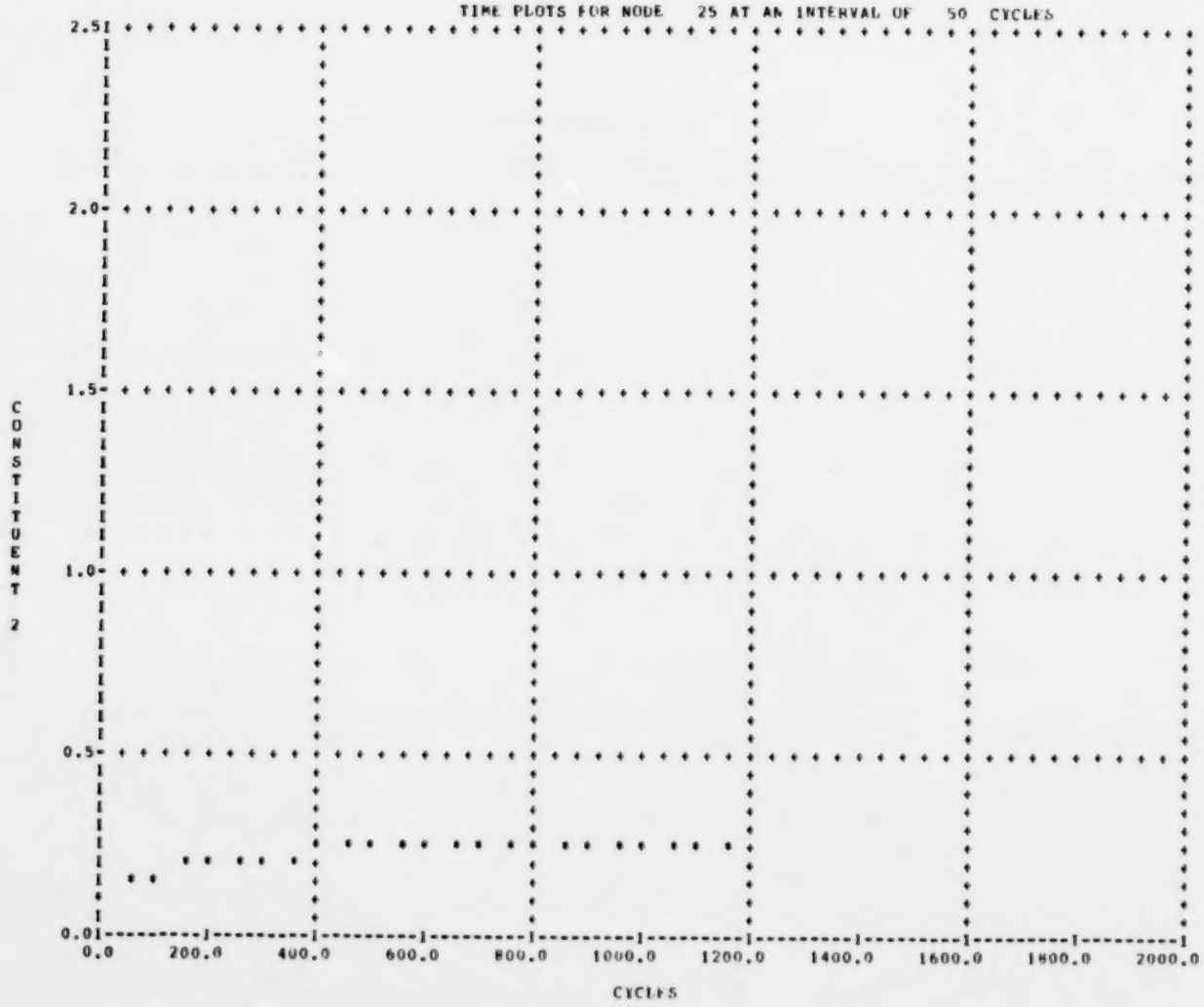

DELAWARE ESTUARY CENTER CHANNEL - QUALITY SUMMARY
SUMMARY STARTS AT CYCLE 800 16 DAYS 16.0 HOURS
SUMMARY ENDS AT CYCLE 1200 25 DAYS 24.0 HOURS
CONSTITUENT 1
2.5
2.0
1.5
1.0
0.5
0.0
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
MILES BELOW TRENTON

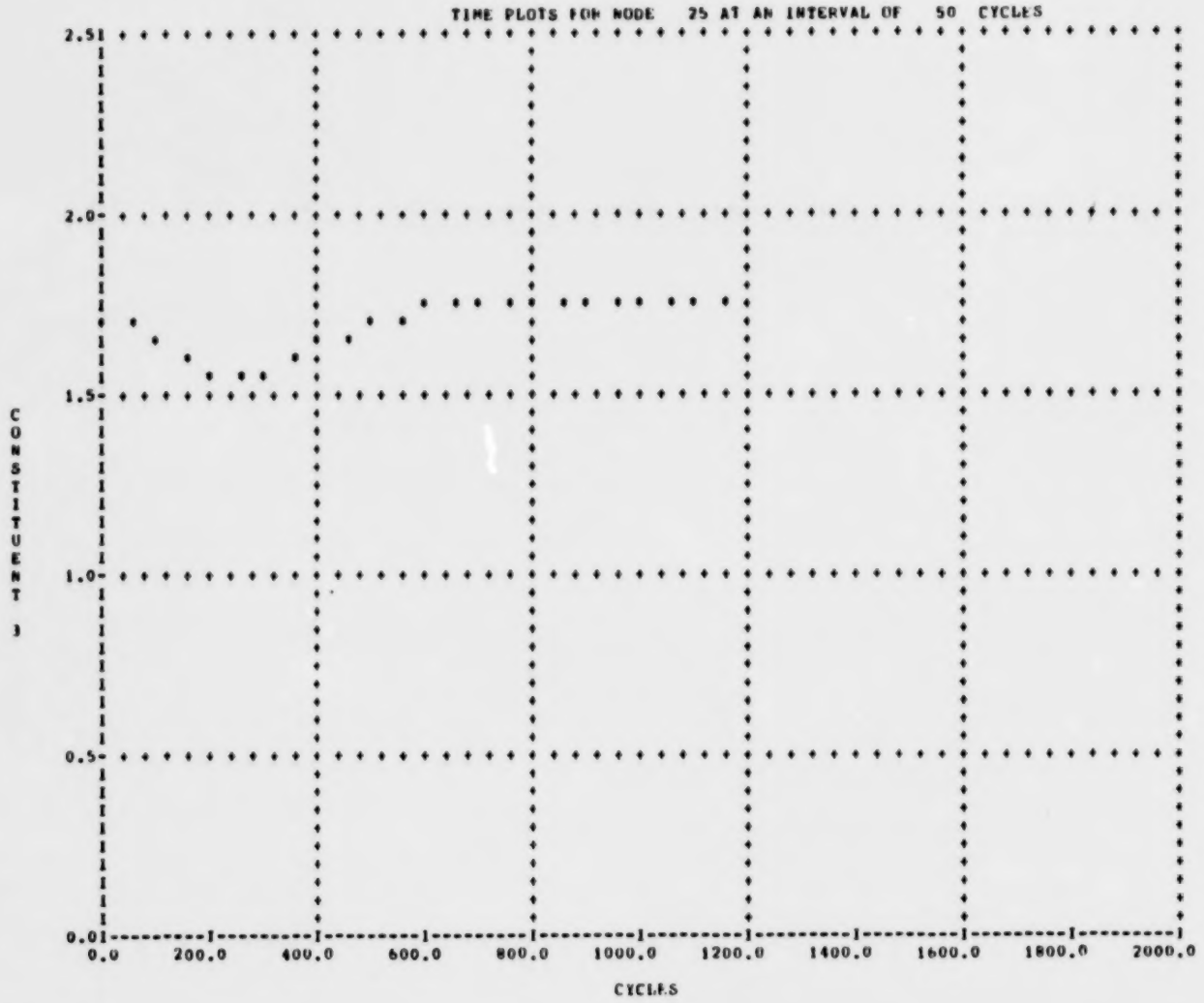

DELAWARE ESTUARY CENTER CHANNEL - QUALITY SUMMARY
SUMMARY STARTS AT CYCLE 800 16 DAYS 16.0 HOURS
SUMMARY ENDS AT CYCLE 1200 25 DAYS 24.0 HOURS
CONSTITUENT 2
2.5
2.0
1.5
1.0
0.5
0.0
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
MILES BELOW TRENTON

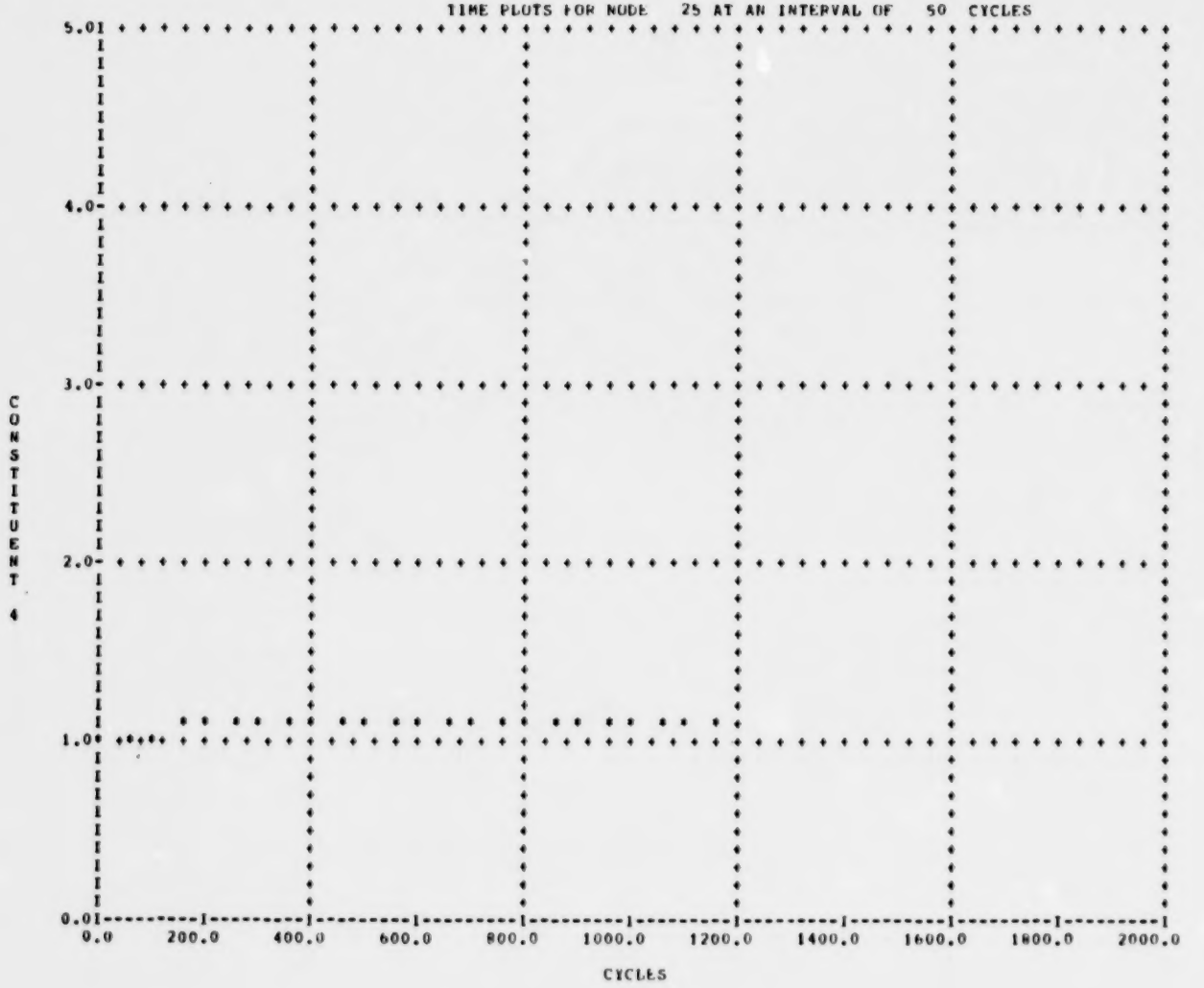

DELAWARE ESTUARY CENTER CHANNEL - QUALITY SUMMARY
SUMMARY STARTS AT CYCLE 800 16 DAYS 16.0 HOURS
SUMMARY ENDS AT CYCLE 1200 25 DAYS 24.0 HOURS
CONSTITUENT 3
2.5
2.0
1.5
1.0
0.5
0.0
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
MILES BELOW TRENTON

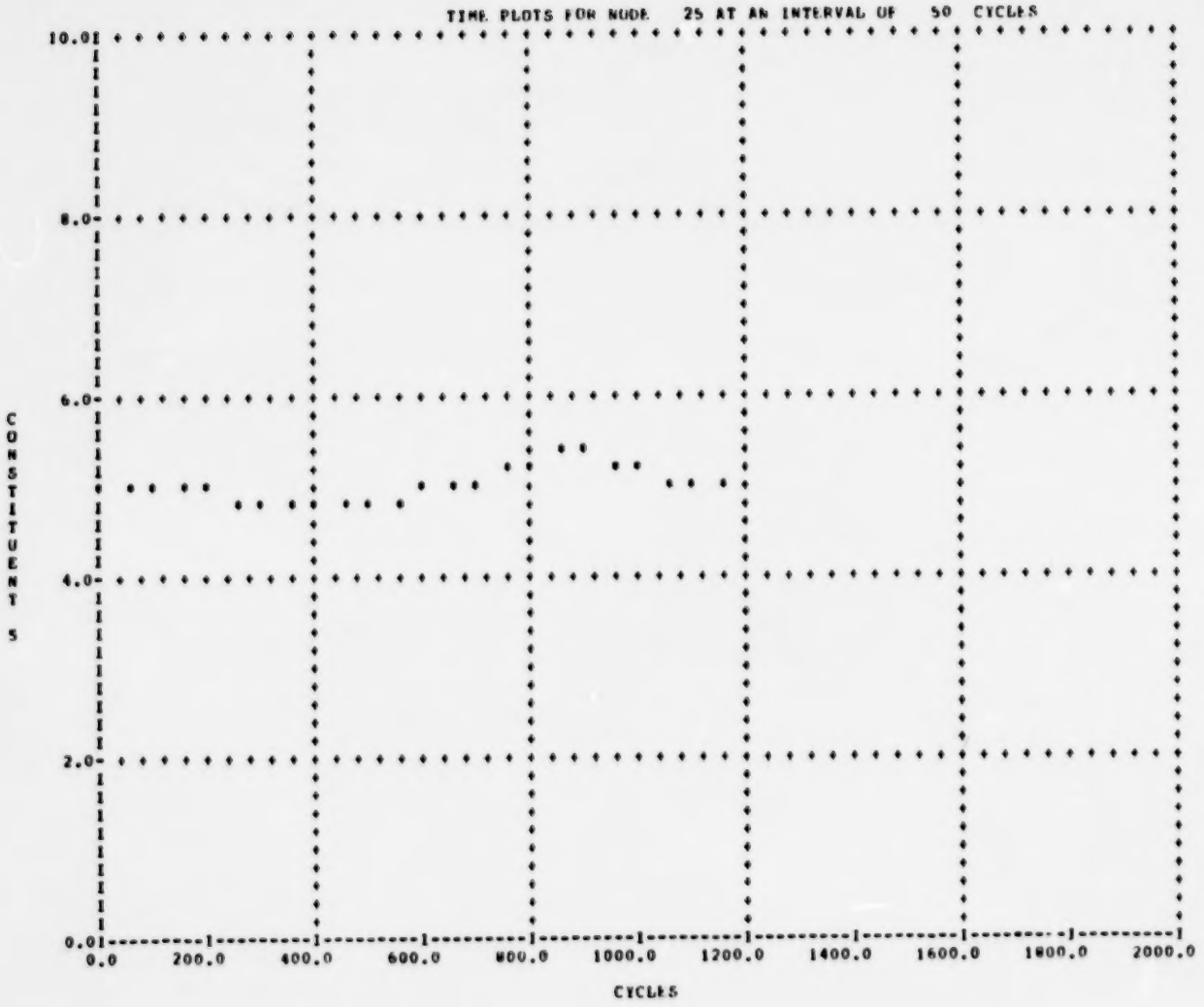

DELAWARE ESTUARY CENTER CHANNEL - QUALITY SUMMARY
SUMMARY STARTS AT CYCLE 800 16 DAYS 16.0 HOURS
SUMMARY ENDS AT CYCLE 1200 25 DAYS 24.0 HOURS
CONSTITUENT 4
5.0
4.0
3.0
2.0
1.0
0.0
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
MILES BELOW TRENTON

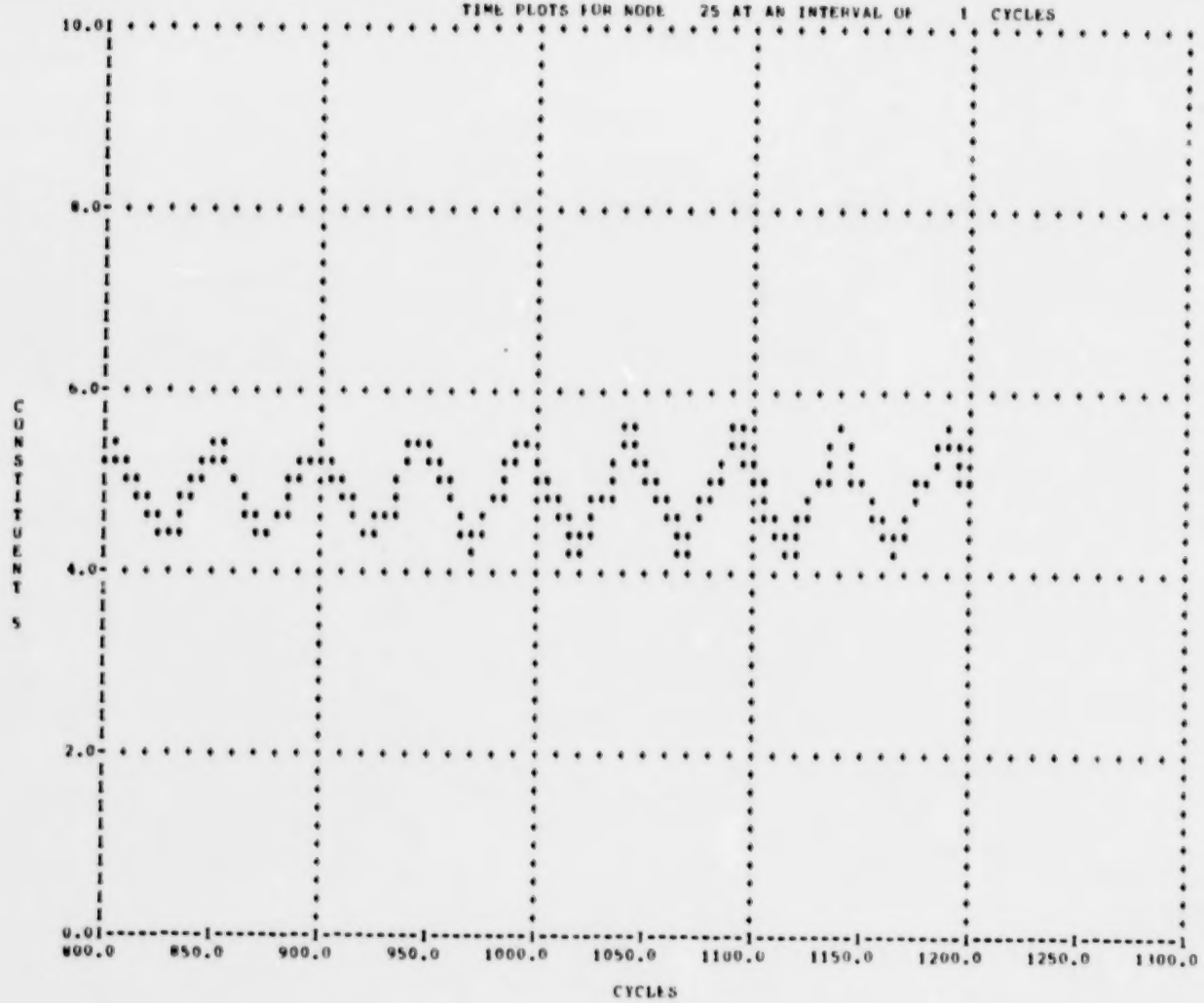

DELAWARE ESTUARY CENTER CHANNEL - QUALITY SUMMARY
SUMMARY STARTS AT CYCLE 800 16 DAYS 16.0 HOURS
SUMMARY ENDS AT CYCLE 1200 25 DAYS 24.0 HOURS
CONSTITUENT 5
10.0
8.0
6.0
4.0
2.0
0.0
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
MILES BELOW TRENTON

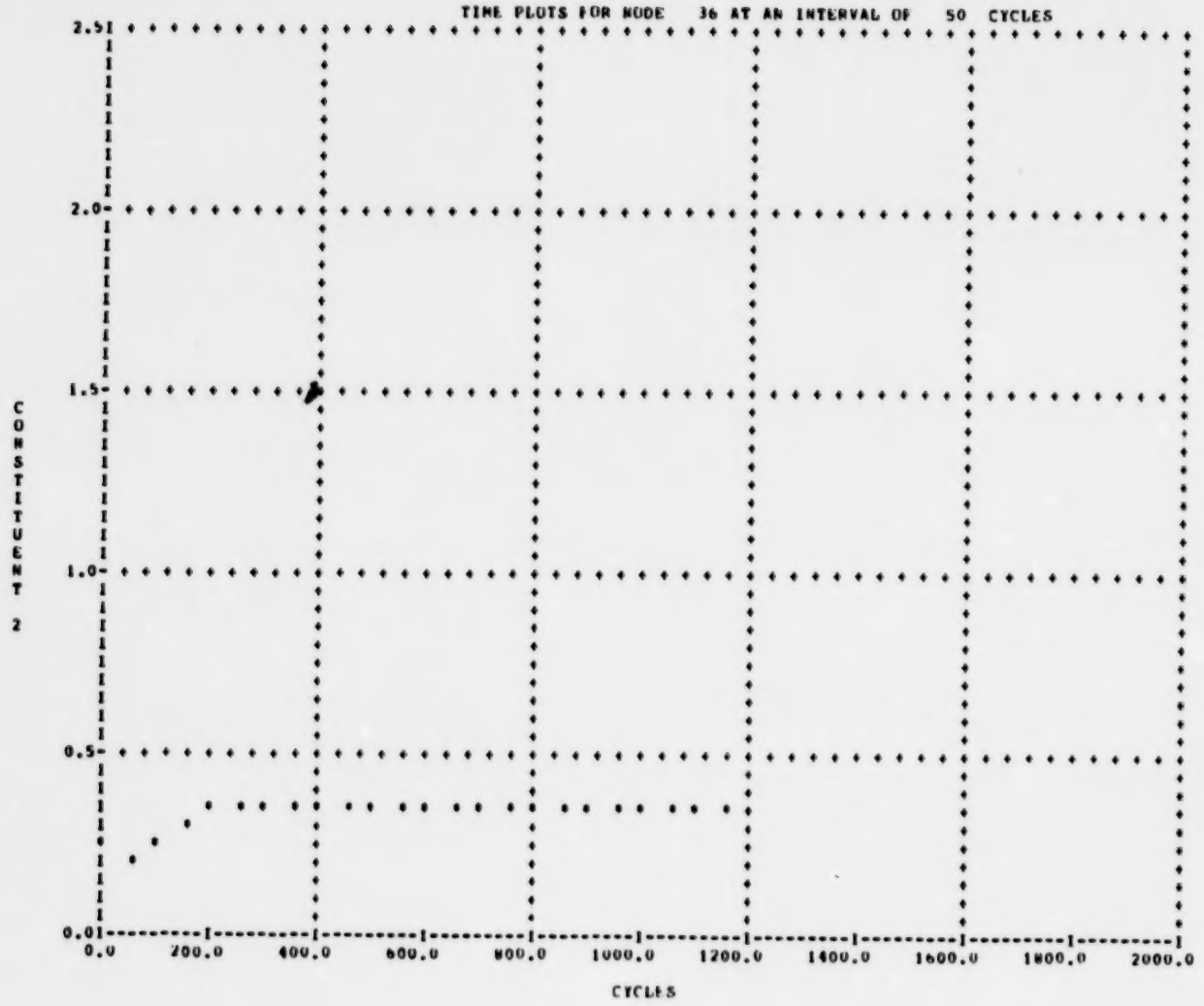

TIME PLOTS FOR NODE 25 AT AN INTERVAL OF 50 CYCLES
CONSTITUENT 2
2.5
2.0
1.5
1.0
0.5
0.0
0.0
200.0
400.0
600.0
800.0
1000.0
1200.0
1400.0
1600.0
1800.0
2000.0
CYCLES

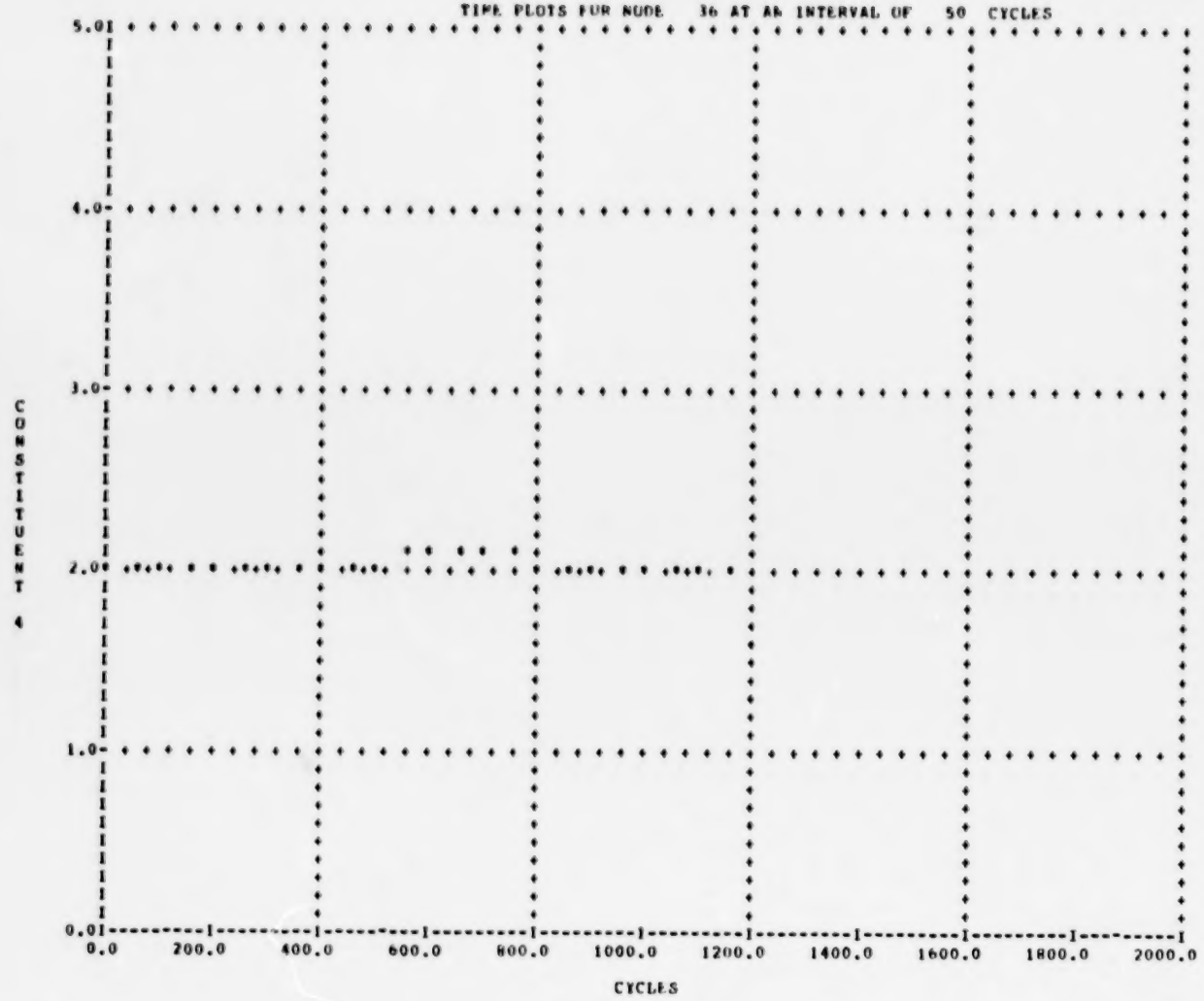

TIME PLOTS FOR NODE 25 AT AN INTERVAL OF 50 CYCLES
CONSTITUENT 3
2.5
2.0
1.5
1.0
0.5
0.0
0.0
200.0
400.0
600.0
800.0
1000.0
1200.0
1400.0
1600.0
1800.0
2000.0
CYCLES

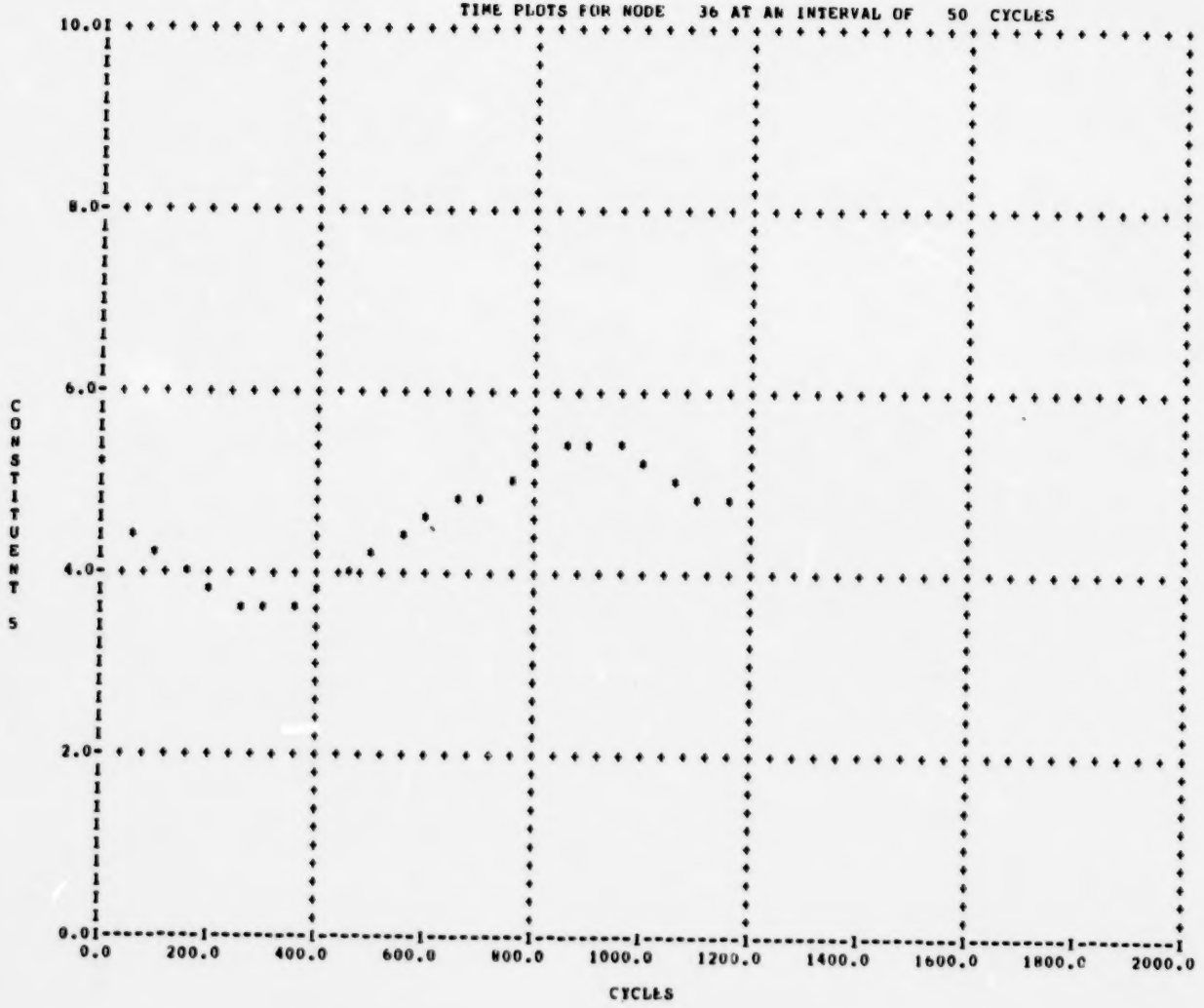

TIME PLOTS FOR NODE 25 AT AN INTERVAL OF 50 CYCLES
CONSTITUENT 4
5.0
4.0
3.0
2.0
1.0
0.0
0.0
200.0
400.0
600.0
800.0
1000.0
1200.0
1400.0
1600.0
1800.0
2000.0
CYCLES

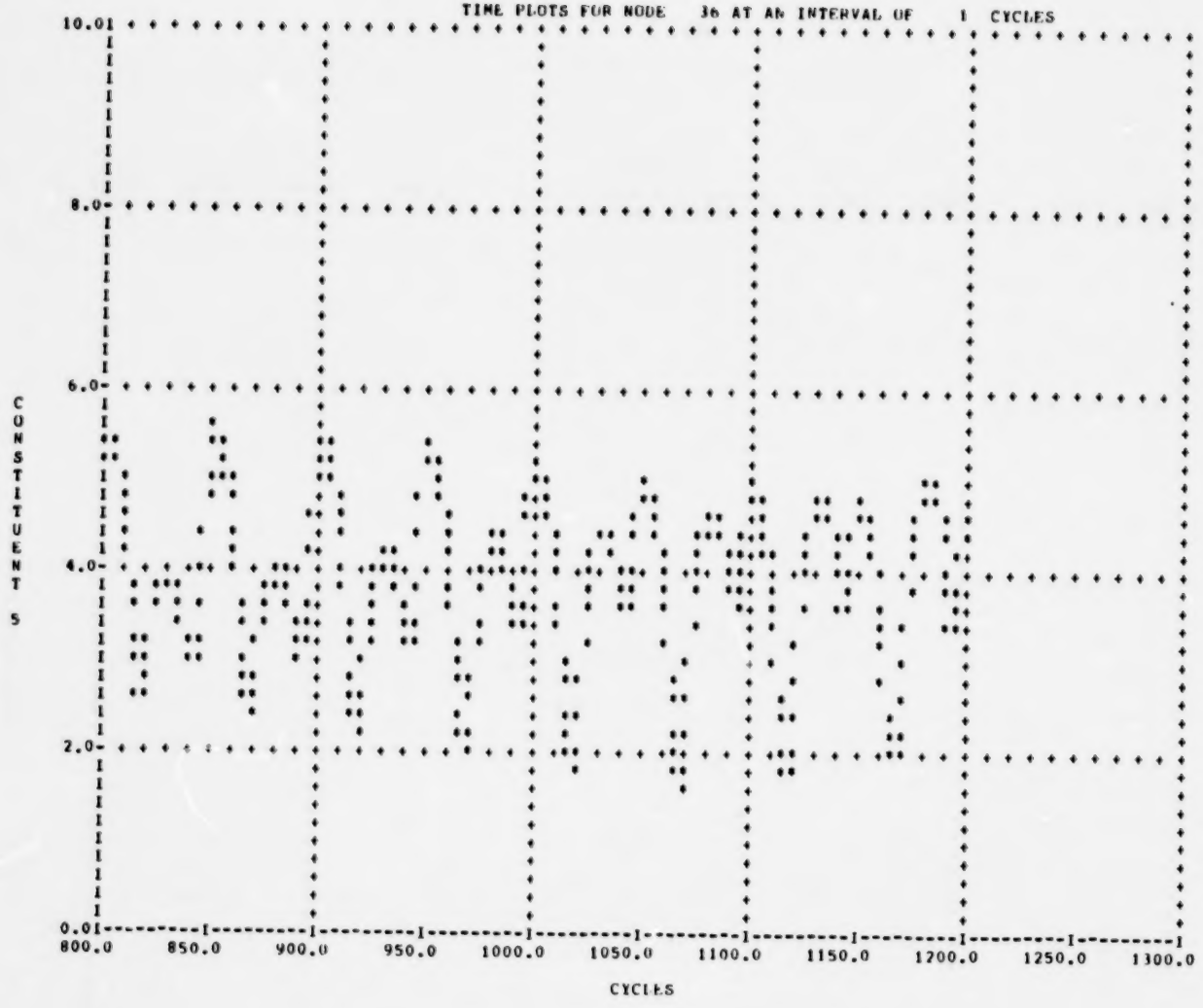

TIME PLOTS FOR NODE 25 AT AN INTERVAL OF 50 CYCLES
10.0
8.0
6.0
4.0
2.0
0.0
CONSTITUENTS
0.0
200.0
400.0
600.0
800.0
1000.0
1200.0
1400.0
1600.0
1800.0
2000.0
CYCLES

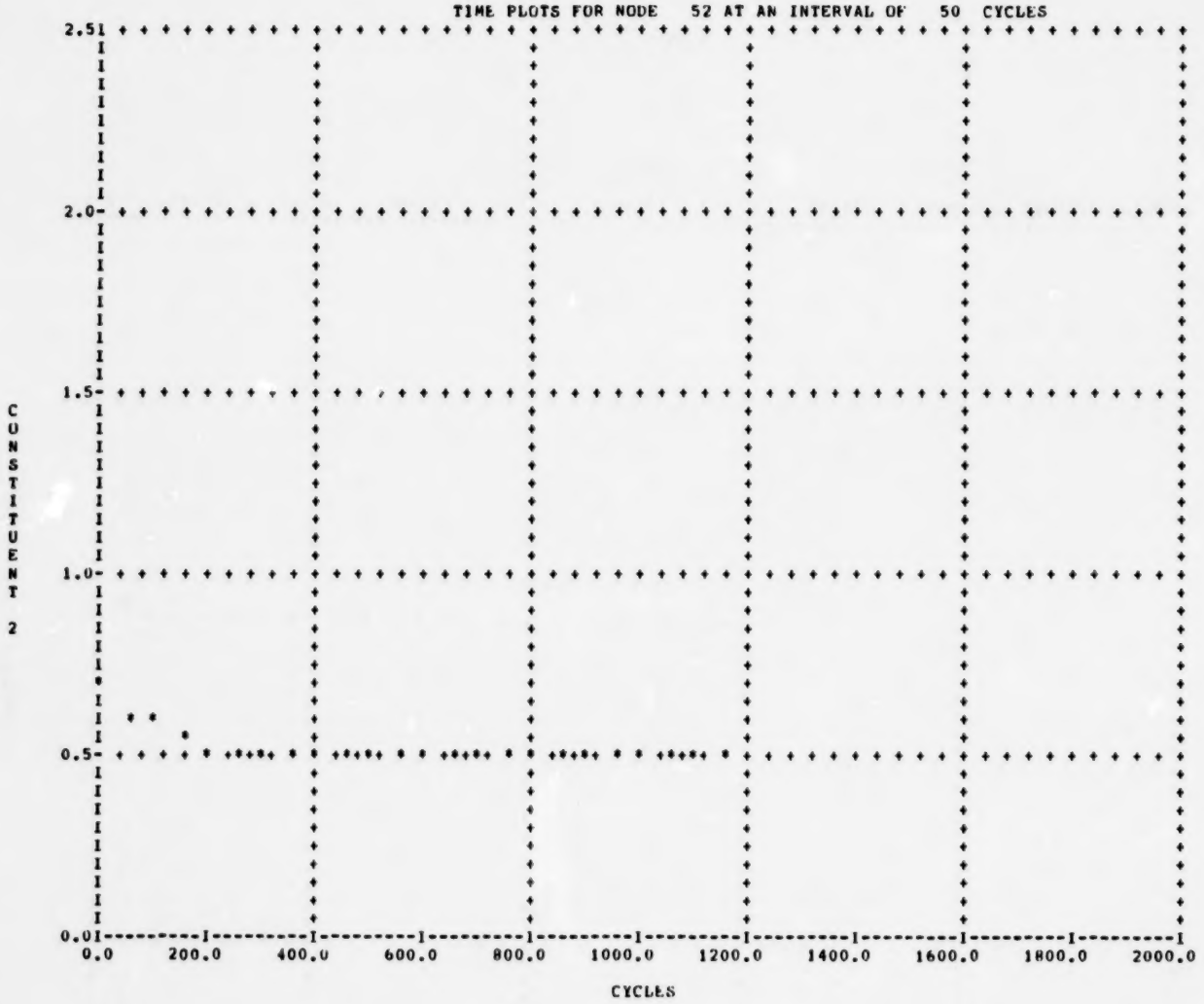

TIME PLOTS FOR NODE 25 AT AN INTERVAL OF 1 CYCLES
10.0
8.0
6.0
4.0
2.0
0.0
CONSTITUENTS
800.0
850.0
900.0
950.0
1000.0
1050.0
1100.0
1150.0
1200.0
1250.0
1300.0
CYCLES

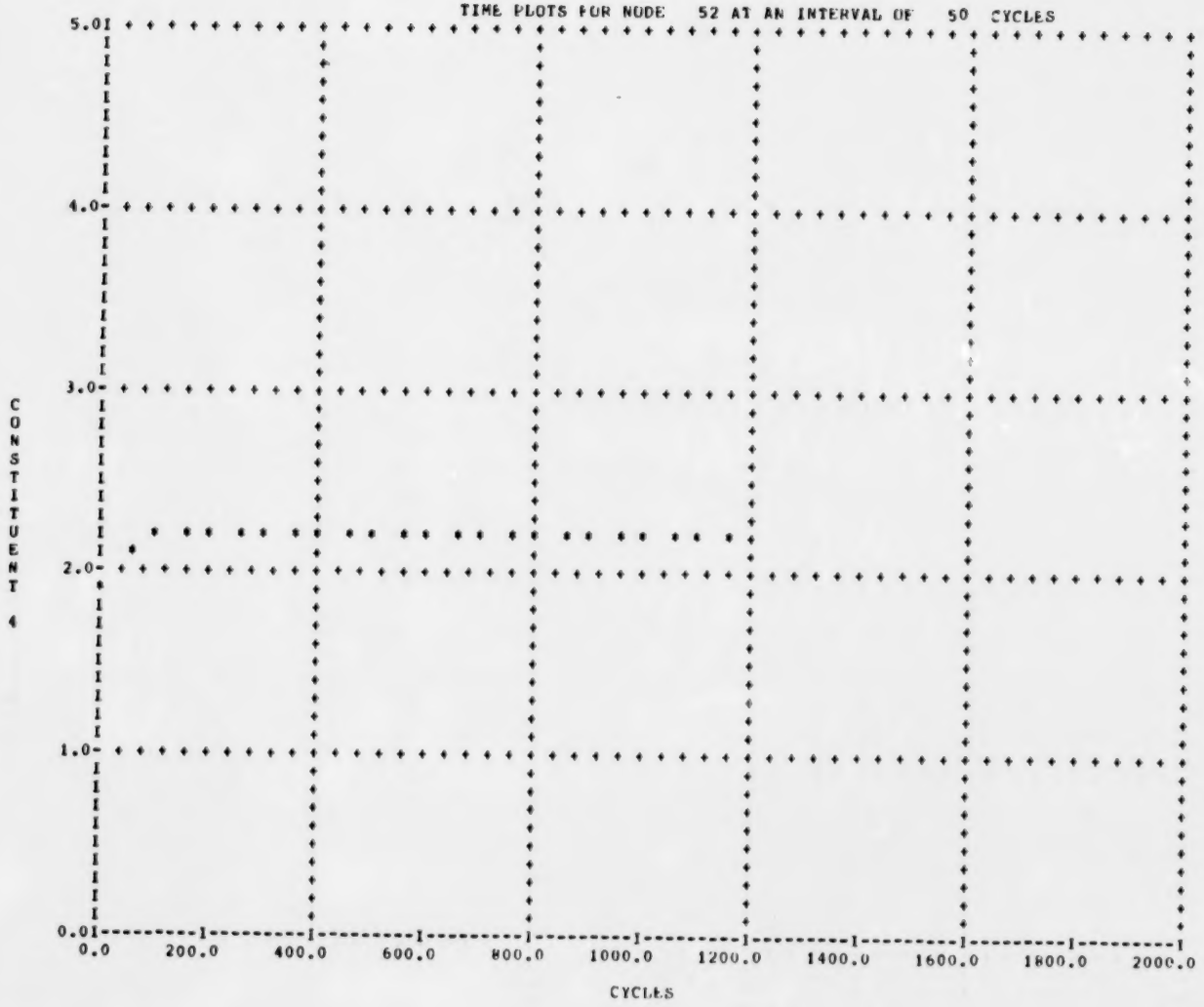

TIME PLOTS FOR NODE 36 AT AN INTERVAL OF 50 CYCLES
CONSTITUENT 2
2.5
2.0
1.5
1.0
0.5
0.01
0.0
200.0
400.0
600.0
800.0
1000.0
1200.0
1400.0
1600.0
1800.0
2000.0
CYCLES

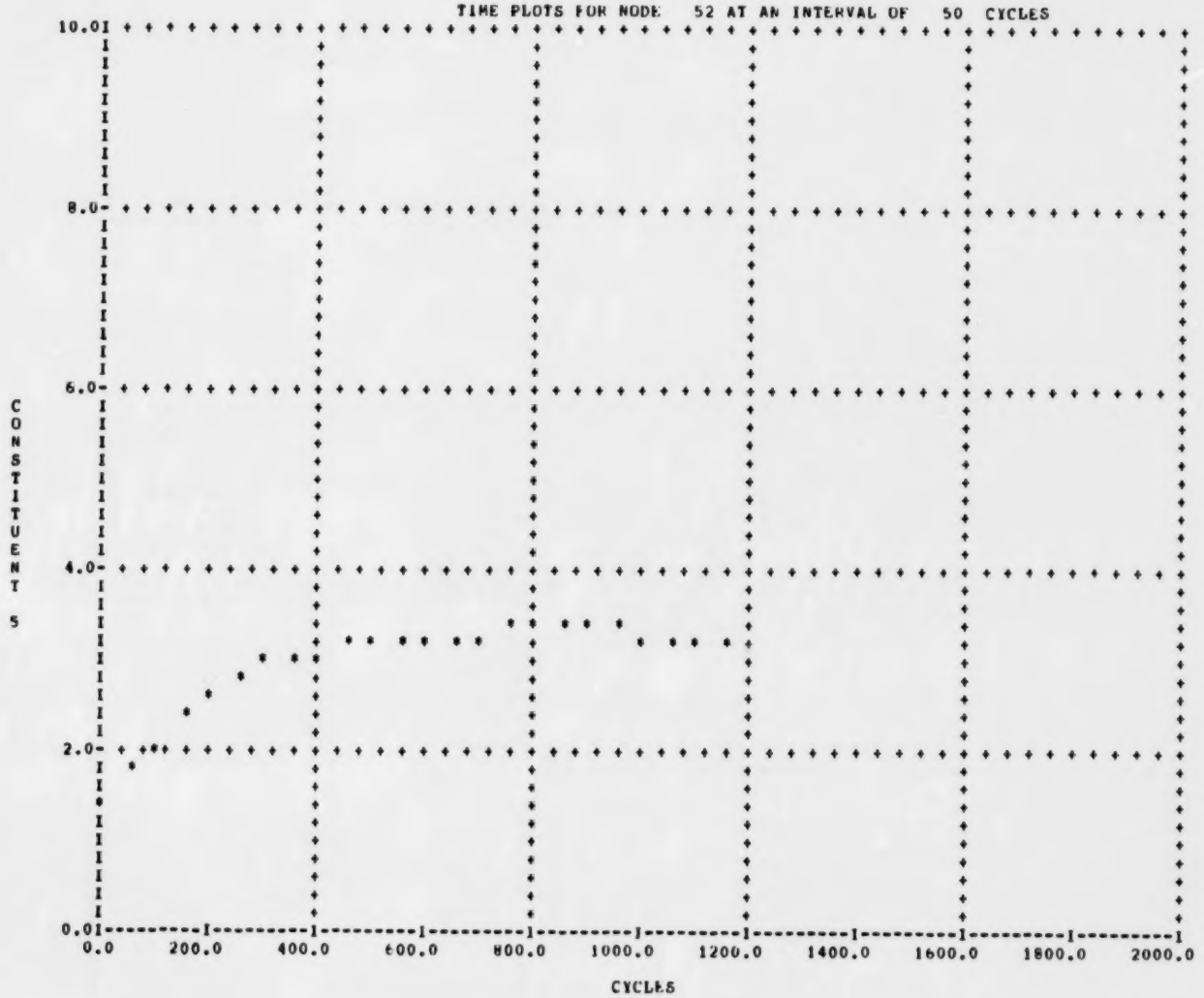

TIME PLOTS FOR NODE 36 AT AN INTERVAL OF 50 CYCLES
CONSTITUENT 4
5.0
4.0
3.0
2.0
1.0
0.0
0.0
200.0
400.0
600.0
800.0
1000.0
1200.0
1400.0
1600.0
1800.0
2000.0
CYCLES

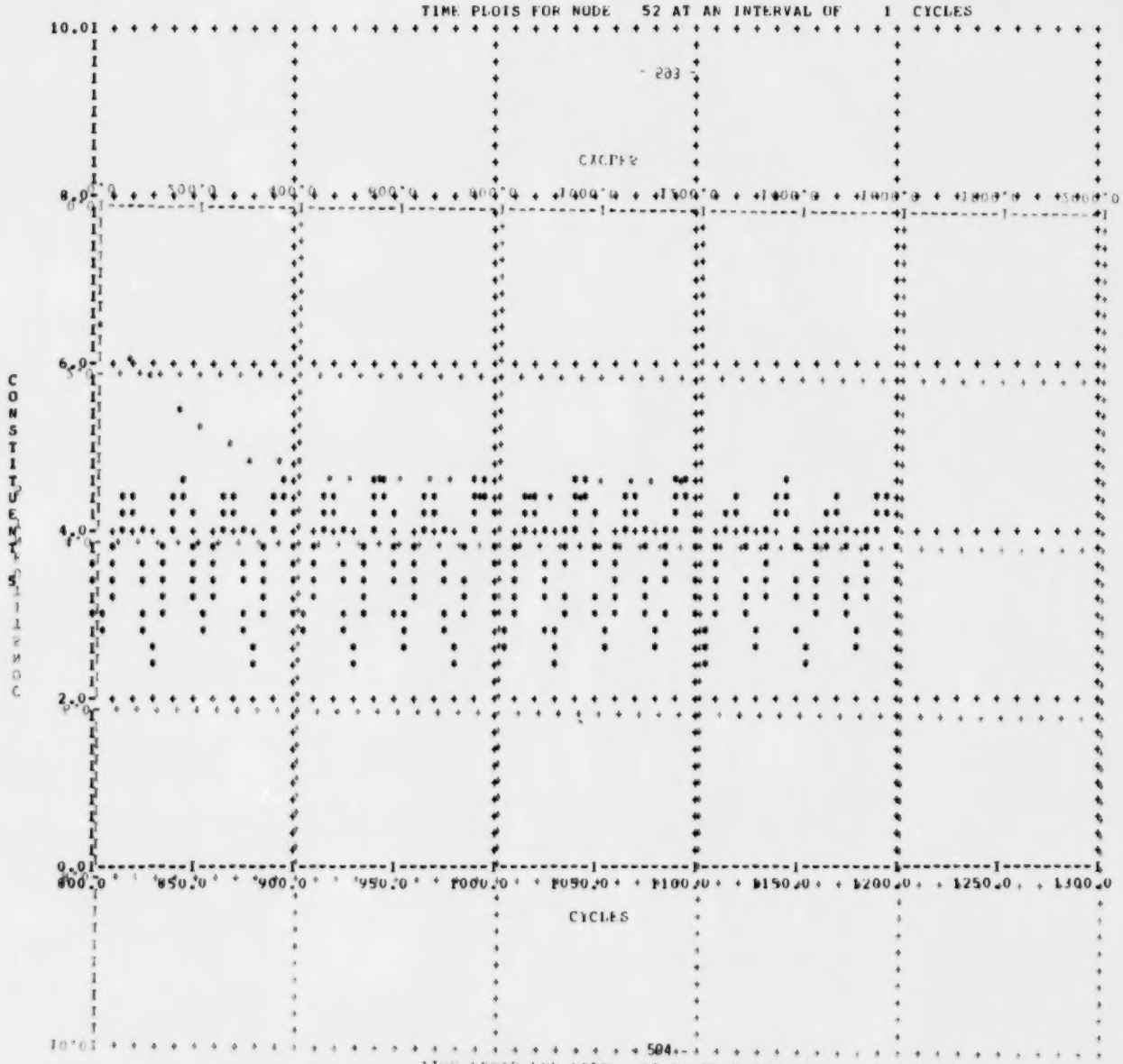

TIME PLOTS FOR NODE 36 AT AN INTERVAL OF 50 CYCLES
CONSTITUENTS
10.0
8.0
6.0
4.0
2.0
0.0
0.0
200.0
400.0
600.0
800.0
1000.0
1200.0
1400.0
1600.0
1800.0
2000.0
CYCLES

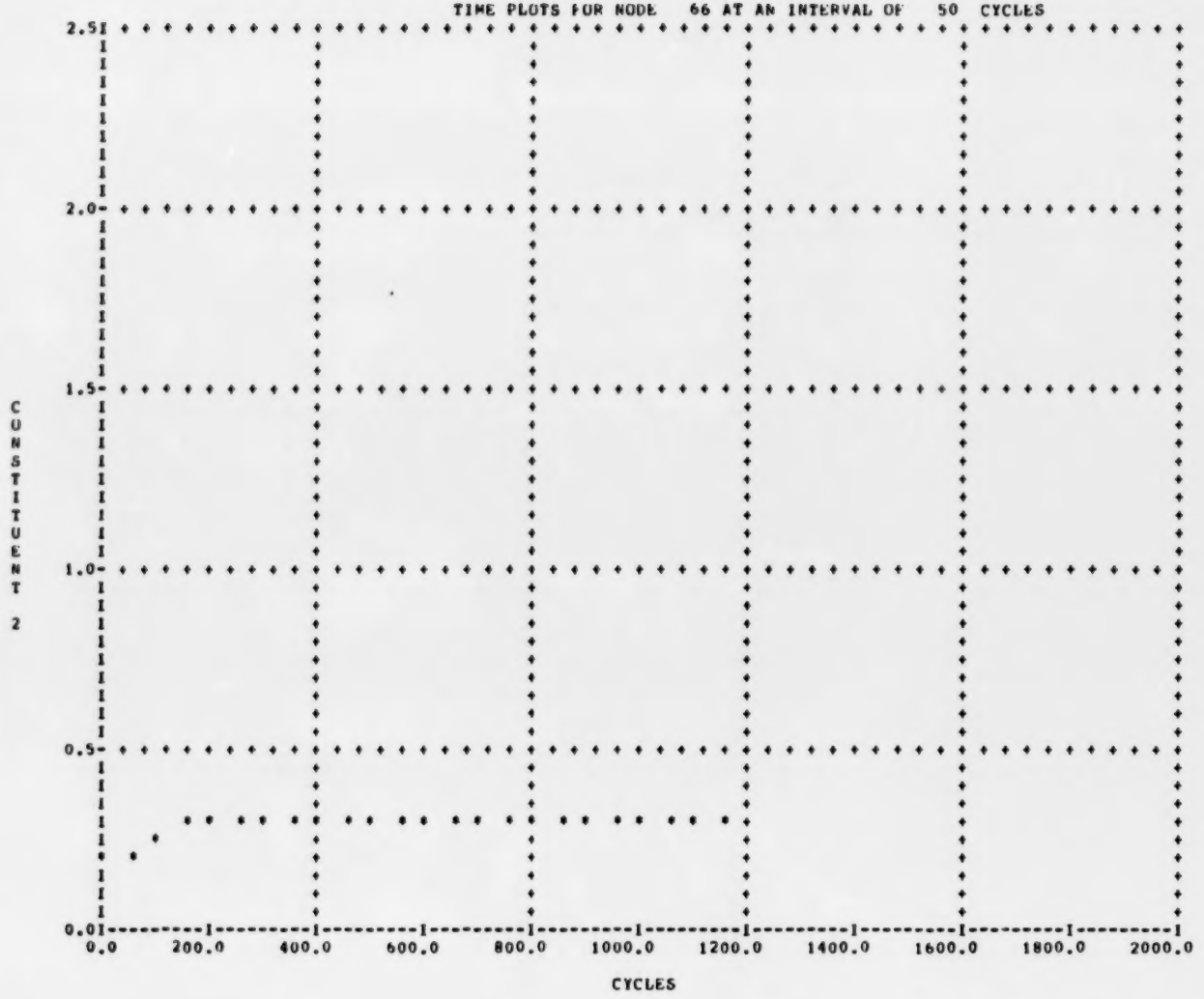

TIME PLOTS FOR NODE 36 AT AN INTERVAL OF 1 CYCLES
10.0
8.0
6.0
4.0
2.0
0.0
CONSTITUENTS
800.0
850.0
900.0
950.0
1000.0
1050.0
1100.0
1150.0
1200.0
1250.0
1300.0
CYCLES

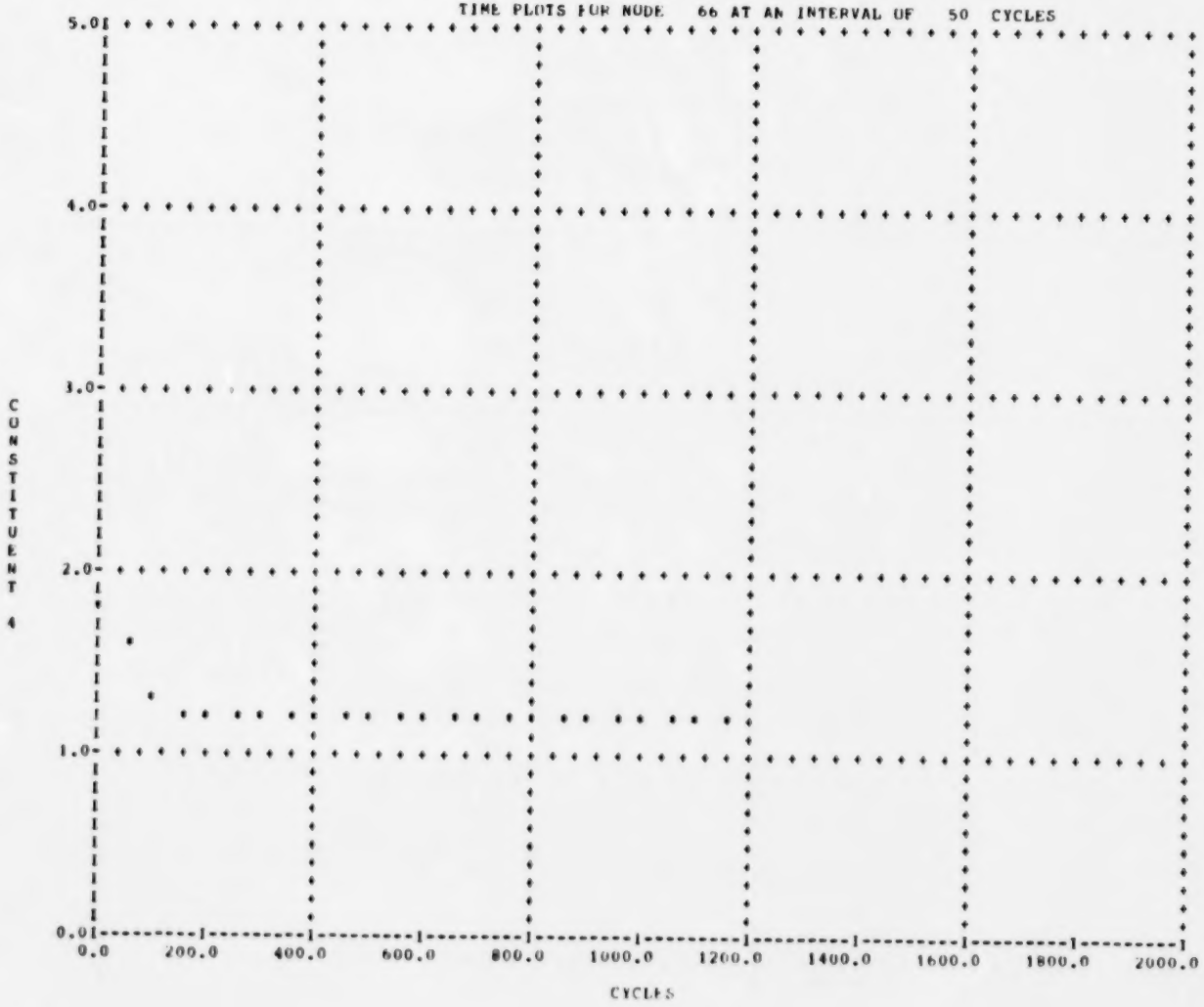

TIME PLOTS FOR NODE 52 AT AN INTERVAL OF 50 CYCLES
CONSTITUENT 2
2.5
2.0
1.5
1.0
0.5
0.0
0.0
200.0
400.0
600.0
800.0
1000.0
1200.0
1400.0
1600.0
1800.0
2000.0
CYCLES

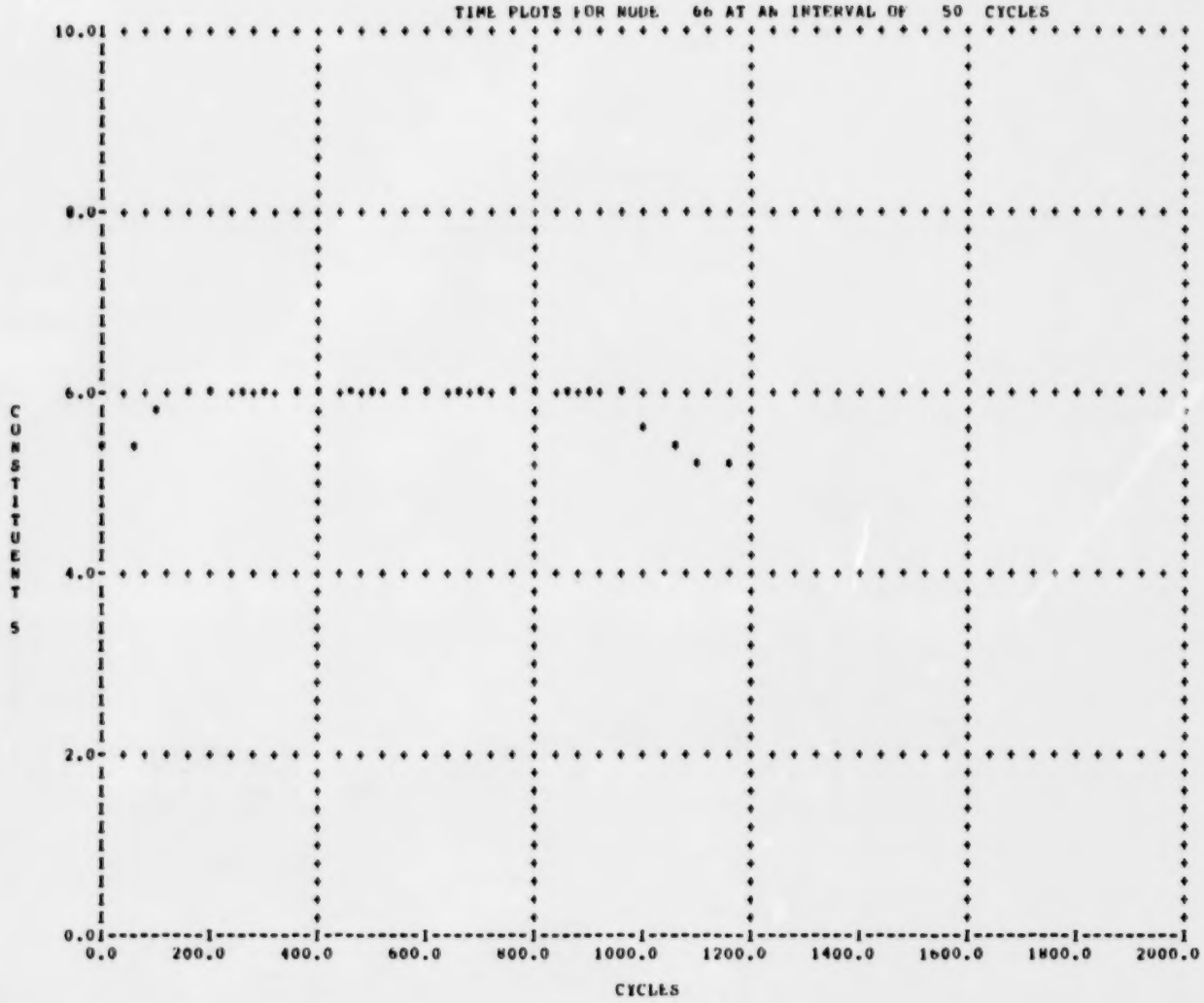

TIME PLOTS FOR NODE 52 AT AN INTERVAL OF 50 CYCLES
CONSTITUENT 4
5.0
4.0
3.0
2.0
1.0
0.0
0.0
200.0
400.0
600.0
800.0
1000.0
1200.0
1400.0
1600.0
1800.0
2000.0
CYCLES

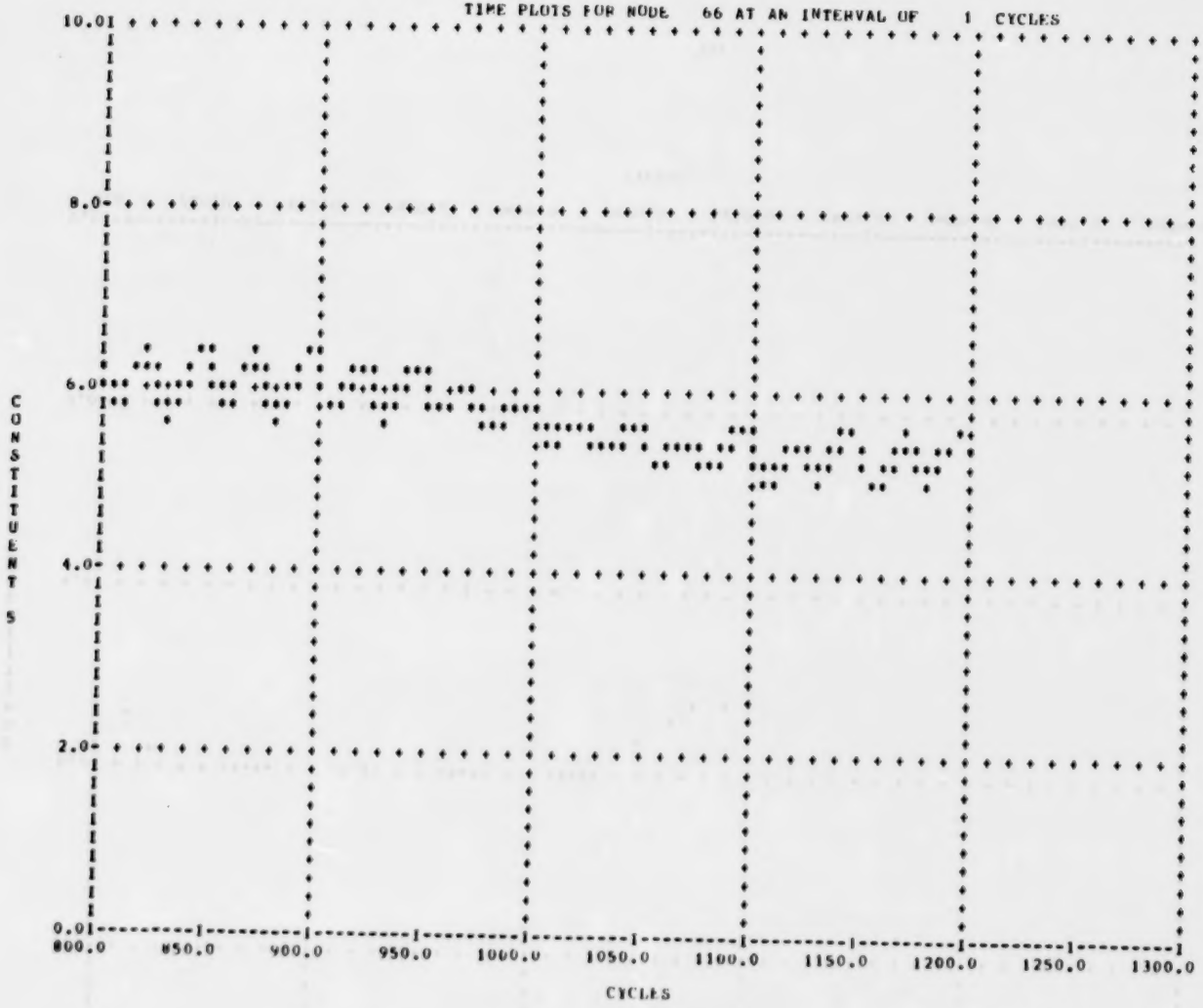

TIME PLOTS FOR NODE 52 AT AN INTERVAL OF 50 CYCLES
CONSTITUENTS
10.0
8.0
6.0
4.0
2.0
0.0
0.0
200.0
400.0
600.0
800.0
1000.0
1200.0
1400.0
1600.0
1800.0
2000.0
CYCLES


TIME PLOTS FOR NODE 52 AT AN INTERVAL OF 1 CYCLES
CONSTITUENTS
10.0
8.0
6.0
4.0
2.0
0.0
800.0
850.0
900.0
950.0
1000.0
1050.0
1100.0
1150.0
1200.0
1250.0
1300.0
CYCLES


TIME PLOTS FOR NODE 66 AT AN INTERVAL OF 50 CYCLES
2.5
2.0
1.5
1.0
0.5
0.0
CONSTITUENT 2
0.0
200.0
400.0
600.0
800.0
1000.0
1200.0
1400.0
1600.0
1800.0
2000.0
CYCLES


TIME PLOTS FOR NODE 66 AT AN INTERVAL OF 50 CYCLES
CONSTITUENT 4
5.0
4.0
3.0
2.0
1.0
0.0
0.0
200.0
400.0
600.0
800.0
1000.0
1200.0
1400.0
1600.0
1800.0
2000.0
CYCLES


TIME PLOTS FOR NODE 66 AT AN INTERVAL OF 50 CYCLES
10.0
8.0
6.0
4.0
2.0
0.0
CONSTITUENTS
0.0
200.0
400.0
600.0
800.0
1000.0
1200.0
1400.0
1600.0
1800.0
2000.0
CYCLES


TIME PLOTS FOR NODE 66 AT AN INTERVAL OF 1 CYCLES
10.0
8.0
6.0
4.0
2.0
0.0
CONSTITUENTS
800.0
850.0
900.0
950.0
1000.0
1050.0
1100.0
1150.0
1200.0
1250.0
1300.0
CYCLES

A.4 D.O. BUDGET TEST CASE OUTPUT LISTING - 2-D NETWORK

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*
*****************************************************************************************************************

                    SECTION 2.1              SET PROGRAM CONTROL OPTIONS

*
*****************************************************************************************************************


DELAWARE ESTUARY MODEL USING EXPERIMENTAL 2-D NETWORK  *** TESTING ***                    ENVIRONMENTAL PROTECTION AGENCY
DELAWARE FLOW = 7900 CFS ** SCHUYLKILL FLOW = 2100 CFS  TAPE EP5231,FILE 3                DYNAMIC WATER QUALITY MODEL
DELAWARE ESTUARY 2-D NETWORK, TRENTON-LISTON POINT. DELAWARE R FLOW = 7880 CFS
                SIMULATION PERIOD : JULY 12 -23, 1976

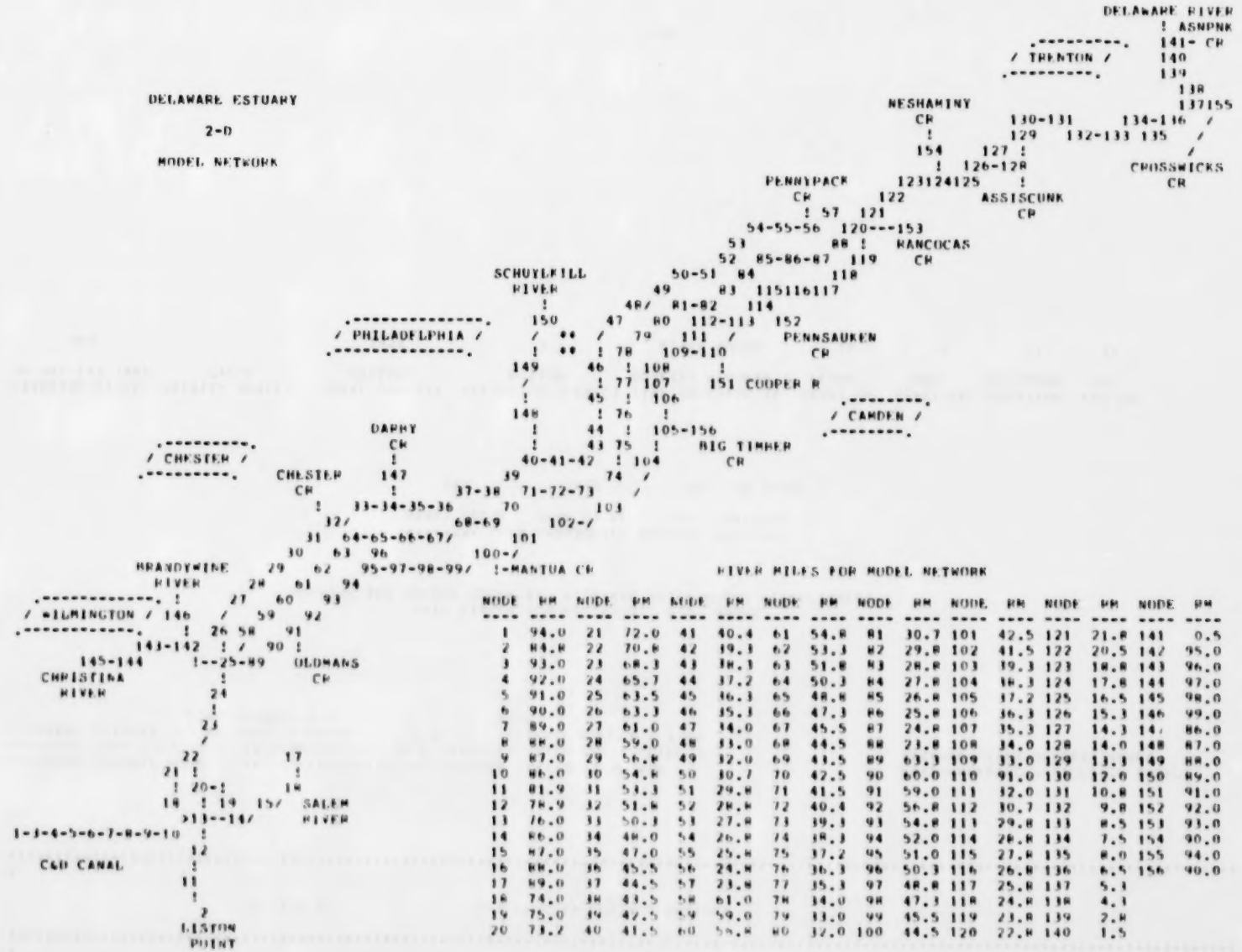

                          THIS SIMULATION BEGINS AT  0.0  HOURS
                     SUNRISE AND SUNSET OCCUR AT  6.00 AND 18.00 HOURS,RESPECTIVELY


                          ******** FROM HYDRAULICS PROGRAM ********
                          START CYCLE   STOP CYCLE    TIME INTERVAL

                              500          1000         90.  SECONDS


STARTING CYCLE  INITIAL QUALITY  TOTAL QUALITY  DEPLETION CORRECT TIME INTERVAL IN  START OF  START OF  DURATION  END OF
ON HYD EXT TAPE      CYCLE          CYCLES           OPTION       QUALITY PROGRAM    FLOOD      EBB     OF FLOOD   EBB

     560               1            1450              3            0.500 HOURS        18         4        11       17
```



RIVER MILES FOR MODEL NETWORK

NODE	RM	NODE	RM	NODE	RM	NODE	RM	NODE	RM	NODE	RM	NODE	RM	NODE	RM
1	94.0	21	72.0	41	40.4	61	54.8	81	30.7	101	42.5	121	21.8	141	0.5
2	84.8	22	70.8	42	39.1	62	53.3	82	29.8	102	41.5	122	20.5	142	95.0
3	93.0	23	68.3	43	38.1	63	51.8	83	28.8	103	39.3	123	18.8	143	96.0
4	92.0	24	65.7	44	37.2	64	50.3	84	27.8	104	38.3	124	17.8	144	97.0
5	91.0	25	63.5	45	36.3	65	48.8	85	26.8	105	37.2	125	16.5	145	98.0
6	90.0	26	63.3	46	35.3	66	47.3	86	25.8	106	36.3	126	15.3	146	99.0
7	89.0	27	61.0	47	34.0	67	45.5	87	24.8	107	35.3	127	14.3	147	86.0
8	88.0	28	59.0	48	33.0	68	44.5	88	23.8	108	34.0	128	14.0	148	87.0
9	87.0	29	56.8	49	32.0	69	43.5	89	63.3	109	33.0	129	13.3	149	88.0
10	86.0	30	54.8	50	30.7	70	42.5	90	60.0	110	91.0	130	12.0	150	89.0
11	81.9	31	53.3	51	29.8	71	41.5	91	59.0	111	32.0	131	10.8	151	91.0
12	78.9	32	51.8	52	28.8	72	40.4	92	56.8	112	30.7	132	9.8	152	92.0
13	76.0	33	50.3	53	27.8	73	39.3	93	54.8	113	29.8	133	8.5	153	93.0
14	86.0	34	48.0	54	26.8	74	38.3	94	52.0	114	28.8	134	7.5	154	90.0
15	87.0	35	47.0	55	25.8	75	37.2	95	51.0	115	27.8	135	8.0	155	94.0
16	88.0	36	45.5	56	24.8	76	36.3	96	50.3	116	26.8	136	6.5	156	90.0
17	89.0	37	44.5	57	23.8	77	35.3	97	48.8	117	25.8	137	5.3		
18	74.0	38	43.5	58	61.0	78	34.0	98	47.3	118	24.8	138	4.3		
19	75.0	39	42.5	59	59.0	79	33.0	99	45.5	119	23.8	139	2.8		
20	78.2	40	41.5	60	58.8	80	32.0	100	44.5	120	22.8	140	1.5		

THE FOLLOWING 10 JUNCTIONS HAVE TIME PLOTS

JUNCTION	STARTING CYCLE	ENDING CYCLE	CYCLE INTERVAL (1=PLOT 0=NO PLOT)	CON1	CON2	CON3	CON4	CON5
25	1	1450	50	0	1	0	0	1
25	1050	1450	1	0	0	0	0	1
61	1	1450	50	0	0	0	0	1
61	1050	1450	1	0	0	0	0	1
48	1	1450	50	0	0	0	0	1
109	1	1450	50	0	0	0	0	1
79	1	1450	50	0	1	0	0	1
79	1050	1450	1	0	0	0	0	1
126	1	1450	50	0	0	0	0	1
126	1050	1450	1	0	0	0	0	1

SECTION 2.2 DEFINE WATER QUALITY CONSTITUENTS

THIS RUN CONSIDERS 5 CONSTITUENTS

CONSTITUENT 1 IS NORG (MG/L)

CONSTITUENT 2 IS NH3 (MG/L)

CONSTITUENT 3 IS NO3 (MG/L)

CONSTITUENT 4 IS CBOD (MG/L)

CONSTITUENT 5 IS DO (MG/L)

***** TABLE OF TRANSFER COEFFICIENTS AND FUNCTION OPERATORS *****

CNST(K)	CO(1,K)	CO(2,K)	CO(3,K)	CO(4,K)	CO(5,K)	FUNC1	FUNC2	FUNC3	FUNC4	FUNC5	FUNC6	FUNC7	FUNC8	FUNC9	FUNC10	FUNC11	FUNC12
1	-1.00	0.0	1.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.00	0.0
2	1.00	-1.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	1.00	-1.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.00
4	0.0	0.0	0.0	-1.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.00	0.0	0.0
5	0.0	-4.57	0.0	-1.00	0.0	1.00	-1.00	0.0	0.0	1.00	-1.00	0.0	0.0	0.0	0.0	0.0	2.86

THE TEMPERATURE FROM CYCLE 1 THROUGH CYCLE 1100 IS 25.0 DEGREES C

********** NOTES ON SPECIAL REACTION LINKAGES **********

THE DENITRIFICATION RATE (DNK) IS DETERMINED BY TEMP AND DO AS FOLLOWS
FOR DO LEVELS ABOVE 1.00 MG/L, DNK = 0
FOR DO LEVELS BETWEEN 1.00 AND 0.20 DNK INCREASES LINEARLY FROM ZERO TO 0.110 /DAY
FOR DO LEVELS BELOW 0.20 MG/L, DNK INCREASES LINEARLY TO 0.26 /DAY
THETA USED FOR TEMPERATURE CORRECTION IS 1.120

REOXYGENATION CONSTANT FOR CONSTITUENT 5 COMPUTED BY O'CONNOR-DOBBINS RELATIONSHIP K2 = 12.9*V**0.5 / H**1.5
K1 AND K2 HAVE BEEN CORRECTED TO 25.00 DEGREES CENTIGRADE

THE DO SATURATION FOR CONSTITUENT 5 AT 25.00 DEG.C IS 8.176

THE SOD RATE (BENTH) IS MODIFIED BY TEMP AND DO AS FOLLOWS
FOR DO LEVELS ABOVE 2.00 MG/L, THE SOD RATE IS UNCHANGED
FOR DO LEVELS BELOW 2.00 SOD = BENTH*(DO/ 2.00)** 0.45
THE THETA USED FOR TEMPERATURE CORRECTION IS 1.050

TABLE OF DECAY RATES (AT 20. C)

SIMULATION PERIOD : JULY 12 -23, 1976

CONSTITUENT 1 IS NORG (MG/L)

CONSTITUENT 2 IS NH3 (MG/L)

CONSTITUENT 3 IS NO3 (MG/L)

CONSTITUENT 4 IS CBOD (MG/L)

CONSTITUENT 5 IS DO (MG/L)

	******** PRIMARY DECAY RATES 1/DAY (BASE E) *******					SECONDARY DECAY 1/DAY		********** SPECIAL DO BUDGET RATES AND PARAMETERS **********							
NODE	CONST1	CONST2	CONST3	CONST4	CONST5	CONST4	CONST1	WINDSP MPH	WINDOX 1/DAY	SOD G/MM/D	CHLORO UG/L	PHOTO MG/CHLORO/D	RESP	DEPTHP FT	DEPTH FT
1	0.070	0.040	0.020	0.230	0.292	0.050	0.120	0.0	0.0	1.00	20.00	0.079	0.012	3.50	14.00
2	0.070	0.300	0.020	0.230	0.704	0.050	0.120	0.0	0.0	1.00	20.00	0.079	0.012	3.50	19.04
3	0.070	0.040	0.020	0.230	0.103	0.050	0.120	0.0	0.0	1.00	20.00	0.079	0.012	3.50	24.33
4	0.070	0.040	0.020	0.230	0.088	0.050	0.120	0.0	0.0	1.00	20.00	0.079	0.012	3.50	29.89
5	0.070	0.040	0.020	0.230	0.120	0.050	0.120	0.0	0.0	1.00	20.00	0.079	0.012	3.50	29.94
6	0.070	0.040	0.020	0.230	0.122	0.050	0.120	0.0	0.0	1.00	20.00	0.079	0.012	3.50	29.83
7	0.070	0.040	0.020	0.230	0.145	0.050	0.120	0.0	0.0	1.00	20.00	0.079	0.012	3.50	27.23
8	0.070	0.040	0.020	0.230	0.190	0.050	0.120	0.0	0.0	1.00	20.00	0.079	0.012	3.50	23.62
9	0.070	0.040	0.020	0.230	0.225	0.050	0.120	0.0	0.0	1.00	20.00	0.079	0.012	3.50	21.44
10	0.070	0.040	0.020	0.230	0.178	0.050	0.120	0.0	0.0	1.00	20.00	0.079	0.012	3.50	19.86
11	0.070	0.300	0.020	0.230	0.217	0.020	0.120	0.0	0.0	0.60	20.00	0.079	0.012	3.50	18.57
12	0.070	0.300	0.020	0.230	0.266	0.020	0.120	0.0	0.0	0.60	20.00	0.079	0.012	3.50	17.18
13	0.070	0.300	0.020	0.230	0.249	0.020	0.120	0.0	0.0	0.60	20.00	0.079	0.012	3.50	17.63
14	0.070	0.040	0.020	0.230	0.524	0.050	0.120	0.0	0.0	1.00	20.00	0.079	0.012	3.50	9.30
15	0.070	0.040	0.020	0.230	0.555	0.050	0.120	0.0	0.0	1.00	20.00	0.079	0.012	3.50	9.36
16	0.070	0.040	0.020	0.230	0.322	0.050	0.120	0.0	0.0	1.00	20.00	0.079	0.012	3.50	9.07
17	0.070	0.040	0.020	0.230	0.227	0.050	0.120	0.0	0.0	1.00	20.00	0.079	0.012	3.50	9.07
18	0.070	0.300	0.020	0.230	0.402	0.020	0.120	0.0	0.0	0.60	20.00	0.079	0.012	3.50	12.77
19	0.070	0.300	0.020	0.230	0.461	0.020	0.120	0.0	0.0	0.60	20.00	0.079	0.012	3.50	9.23
20	0.070	0.300	0.020	0.230	0.250	0.020	0.120	0.0	0.0	0.60	20.00	0.079	0.012	3.50	18.15
21	0.070	0.300	0.020	0.230	0.346	0.020	0.120	0.0	0.0	0.60	20.00	0.079	0.012	3.50	12.68
22	0.070	0.300	0.020	0.230	0.239	0.020	0.120	0.0	0.0	0.60	20.00	0.079	0.012	3.50	17.56
23	0.070	0.300	0.020	0.230	0.202	0.020	0.120	0.0	0.0	0.60	20.00	0.079	0.012	3.50	19.08
24	0.070	0.300	0.020	0.230	0.173	0.020	0.120	0.0	0.0	0.60	20.00	0.079	0.012	3.50	21.07
25	0.070	0.300	0.020	0.230	0.169	0.020	0.120	0.0	0.0	0.60	20.00	0.079	0.012	3.50	21.01
26	0.070	0.300	0.020	0.230	0.092	0.020	0.120	0.0	0.0	0.60	20.00	0.079	0.012	6.30	31.24
27	0.070	0.300	0.020	0.230	0.105	0.020	0.120	0.0	0.0	0.60	20.00	0.079	0.012	6.30	28.99
28	0.070	0.500	0.020	0.230	0.113	0.020	0.120	0.0	0.0	1.00	20.00	0.079	0.012	6.30	27.32
29	0.070	0.500	0.020	0.230	0.101	0.020	0.120	0.0	0.0	1.00	20.00	0.079	0.012	8.50	29.78
30	0.070	0.500	0.020	0.230	0.077	0.020	0.120	0.0	0.0	1.00	20.00	0.079	0.012	8.50	32.30
31	0.070	0.500	0.020	0.230	0.102	0.020	0.120	0.0	0.0	1.00	20.00	0.079	0.012	8.50	28.28
32	0.070	0.500	0.020	0.230	0.123	0.020	0.120	0.0	0.0	1.00	20.00	0.079	0.012	8.50	26.89
33	0.070	0.500	0.020	0.230	0.110	0.020	0.120	0.0	0.0	1.00	20.00	0.079	0.012	8.50	26.22
34	0.070	0.150	0.020	0.230	0.200	0.020	0.120	0.0	0.0	2.70	25.00	0.079	0.012	8.50	14.29

35	0.070	0.150	0.020	0.230	0.418	0.020	0.120	0.0	0.0	2.70	25.00	0.079	0.012	10.00	9.82
36	0.070	0.150	0.020	0.230	0.210	0.020	0.120	0.0	0.0	2.70	25.00	0.079	0.012	10.00	16.22
37	0.070	0.150	0.020	0.230	0.096	0.020	0.150	0.0	0.0	2.70	25.00	0.079	0.012	10.00	27.83
38	0.070	0.150	0.020	0.230	0.067	0.070	0.150	0.0	0.0	2.70	25.00	0.079	0.012	10.00	35.02
39	0.070	0.150	0.020	0.230	0.086	0.070	0.150	0.0	0.0	2.70	25.00	0.079	0.012	10.00	27.75
40	0.070	0.150	0.020	0.230	0.068	0.070	0.150	0.0	0.0	2.70	25.00	0.079	0.012	10.00	33.73
41	0.070	0.150	0.020	0.230	0.107	0.070	0.150	0.0	0.0	2.70	25.00	0.079	0.012	10.00	24.76
42	0.070	0.150	0.020	0.230	0.237	0.070	0.150	0.0	0.0	2.70	25.00	0.079	0.012	10.00	15.52
43	0.070	0.150	0.020	0.230	0.101	0.070	0.150	0.0	0.0	2.70	25.00	0.079	0.012	10.00	27.18
44	0.070	0.060	0.020	0.230	0.072	0.070	0.150	0.0	0.0	4.00	25.00	0.079	0.012	10.00	35.10
45	0.070	0.060	0.020	0.230	0.085	0.070	0.150	0.0	0.0	4.00	25.00	0.079	0.012	10.00	31.70
46	0.070	0.060	0.020	0.230	0.091	0.070	0.150	0.0	0.0	4.00	25.00	0.079	0.012	10.00	30.62
47	0.070	0.060	0.020	0.230	0.093	0.070	0.150	0.0	0.0	4.00	25.00	0.079	0.012	10.00	30.49
48	0.070	0.060	0.020	0.230	0.086	0.070	0.150	0.0	0.0	4.00	25.00	0.079	0.012	10.00	32.68
49	0.070	0.060	0.020	0.230	0.089	0.070	0.150	0.0	0.0	4.00	25.00	0.079	0.012	8.50	31.15
50	0.070	0.060	0.020	0.230	0.079	0.070	0.150	0.0	0.0	4.00	25.00	0.079	0.012	8.50	32.25
51	0.070	0.060	0.020	0.230	0.103	0.070	0.150	0.0	0.0	4.00	25.00	0.079	0.012	8.50	26.97
52	0.070	0.060	0.020	0.230	0.132	0.070	0.150	0.0	0.0	4.00	75.00	0.079	0.012	8.50	20.83
53	0.070	0.060	0.020	0.230	0.094	0.070	0.150	0.0	0.0	4.00	75.00	0.079	0.012	8.50	27.27
54	0.070	0.060	0.020	0.230	0.112	0.070	0.150	0.0	0.0	4.00	75.00	0.079	0.012	8.50	24.95
55	0.070	0.300	0.020	0.230	0.143	0.070	0.150	0.0	0.0	1.00	110.00	0.079	0.012	8.50	20.92
56	0.070	0.300	0.020	0.230	0.131	0.070	0.150	0.0	0.0	1.00	110.00	0.079	0.012	8.50	20.60
57	0.070	0.300	0.020	0.230	0.108	0.070	0.150	0.0	0.0	1.00	110.00	0.079	0.012	8.50	25.55
58	0.070	0.300	0.020	0.230	0.169	0.020	0.120	0.0	0.0	0.60	20.00	0.079	0.012	6.30	19.18
59	0.070	0.500	0.020	0.230	0.126	0.020	0.120	0.0	0.0	1.00	20.00	0.079	0.012	6.30	26.23
60	0.070	0.500	0.020	0.230	0.097	0.020	0.120	0.0	0.0	1.00	20.00	0.079	0.012	8.50	29.54
61	0.070	0.500	0.020	0.230	0.056	0.020	0.120	0.0	0.0	1.00	20.00	0.079	0.012	8.50	41.34
62	0.070	0.500	0.020	0.230	0.069	0.020	0.120	0.0	0.0	1.00	20.00	0.079	0.012	8.50	36.11
63	0.070	0.500	0.020	0.230	0.079	0.020	0.120	0.0	0.0	1.00	20.00	0.079	0.012	8.50	36.79
64	0.070	0.500	0.020	0.230	0.108	0.020	0.120	0.0	0.0	1.00	20.00	0.079	0.012	8.50	29.78
65	0.070	0.500	0.020	0.230	0.081	0.020	0.120	0.0	0.0	2.70	25.00	0.079	0.012	8.50	35.77
66	0.070	0.150	0.020	0.230	0.075	0.020	0.120	0.0	0.0	1.60	25.00	0.079	0.012	10.00	36.31
67	0.070	0.150	0.020	0.230	0.073	0.020	0.120	0.0	0.0	1.60	25.00	0.079	0.012	10.00	36.68
68	0.070	0.150	0.020	0.230	0.058	0.020	0.150	0.0	0.0	1.60	25.00	0.079	0.012	10.00	41.89
69	0.070	0.150	0.020	0.230	0.055	0.070	0.150	0.0	0.0	1.60	25.00	0.079	0.012	10.00	41.51
70	0.070	0.150	0.020	0.230	0.064	0.070	0.150	0.0	0.0	1.60	25.00	0.079	0.012	10.00	35.35
71	0.070	0.150	0.020	0.230	0.080	0.070	0.150	0.0	0.0	1.60	25.00	0.079	0.012	10.00	29.52
72	0.070	0.150	0.020	0.230	0.075	0.070	0.150	0.0	0.0	1.60	25.00	0.079	0.012	10.00	32.96
73	0.070	0.150	0.020	0.230	0.089	0.070	0.150	0.0	0.0	1.60	25.00	0.079	0.012	10.00	31.05
74	0.070	0.150	0.020	0.230	0.088	0.070	0.150	0.0	0.0	1.60	25.00	0.079	0.012	10.00	32.12
75	0.070	0.060	0.020	0.230	0.057	0.070	0.150	0.0	0.0	2.70	25.00	0.079	0.012	10.00	40.53
76	0.070	0.060	0.020	0.230	0.060	0.070	0.150	0.0	0.0	2.70	25.00	0.079	0.012	10.00	41.10
77	0.070	0.060	0.020	0.230	0.064	0.070	0.150	0.0	0.0	2.70	25.00	0.079	0.012	10.00	38.99
78	0.070	0.060	0.020	0.230	0.064	0.070	0.150	0.0	0.0	2.70	25.00	0.079	0.012	10.00	39.46
79	0.070	0.060	0.020	0.230	0.074	0.070	0.150	0.0	0.0	2.70	25.00	0.079	0.012	10.00	37.30
80	0.070	0.060	0.020	0.230	0.081	0.070	0.150	0.0	0.0	2.70	25.00	0.079	0.012	8.50	33.85
81	0.070	0.060	0.020	0.230	0.069	0.070	0.150	0.0	0.0	2.70	25.00	0.079	0.012	8.50	37.08
82	0.070	0.060	0.020	0.230	0.059	0.070	0.150	0.0	0.0	2.70	25.00	0.079	0.012	8.50	39.41
83	0.070	0.060	0.020	0.230	0.068	0.070	0.150	0.0	0.0	2.70	75.00	0.079	0.012	8.50	39.46
84	0.070	0.060	0.020	0.230	0.076	0.070	0.150	0.0	0.0	2.70	75.00	0.079	0.012	8.50	36.57
85	0.070	0.060	0.020	0.230	0.074	0.070	0.150	0.0	0.0	2.70	75.00	0.079	0.012	8.50	35.11
86	0.070	0.300	0.020	0.230	0.078	0.070	0.150	0.0	0.0	1.00	110.00	0.079	0.012	8.50	33.30
87	0.070	0.300	0.020	0.230	0.077	0.070	0.150	0.0	0.0	1.00	110.00	0.079	0.012	8.50	31.78
88	0.070	0.300	0.020	0.230	0.074	0.070	0.150	0.0	0.0	1.00	110.00	0.079	0.012	8.50	32.85
89	0.070	0.300	0.020	0.230	0.225	0.070	0.120	0.0	0.0	0.60	20.00	0.079	0.012	6.30	15.58
90	0.070	0.300	0.020	0.230	0.201	0.020	0.120	0.0	0.0	0.60	20.00	0.079	0.012	6.30	16.26
91	0.070	0.500	0.020	0.230	0.342	0.020	0.120	0.0	0.0	1.00	20.00	0.079	0.012	6.30	11.11
92	0.070	0.500	0.020	0.230	0.214	0.020	0.120	0.0	0.0	1.00	20.00	0.079	0.012	8.50	13.78
93	0.070	0.500	0.020	0.230	0.106	0.020	0.120	0.0	0.0	1.00	20.00	0.079	0.012	8.50	21.13
94	0.070	0.500	0.020	0.230	0.210	0.020	0.120	0.0	0.0	1.00	20.00	0.079	0.012	8.50	14.96
95	0.070	0.500	0.020	0.230	0.556	0.020	0.120	0.0	0.0	1.00	20.00	0.079	0.012	8.50	7.98

96	0.070	0.500	0.020	0.230	0.227	0.020	0.120	0.0	0.0	1.00	20.00	0.079	0.012	8.50	13.16
97	0.070	0.500	0.020	0.230	0.180	0.020	0.120	0.0	0.0	1.00	25.00	0.079	0.012	8.50	19.47
98	0.070	0.150	0.020	0.230	0.101	0.020	0.120	0.0	0.0	1.00	25.00	0.079	0.012	10.00	29.74
99	0.070	0.150	0.020	0.230	0.069	0.020	0.120	0.0	0.0	1.00	25.00	0.079	0.012	10.00	30.73
100	0.070	0.150	0.020	0.230	0.169	0.020	0.150	0.0	0.0	1.00	25.00	0.079	0.012	10.00	16.95
101	0.070	0.150	0.020	0.230	0.217	0.070	0.150	0.0	0.0	1.00	25.00	0.079	0.012	10.00	12.88
102	0.070	0.150	0.020	0.230	0.167	0.070	0.150	0.0	0.0	1.00	25.00	0.079	0.012	10.00	16.29
103	0.070	0.150	0.020	0.230	0.135	0.070	0.150	0.0	0.0	1.00	25.00	0.079	0.012	10.00	20.26
104	0.070	0.150	0.020	0.230	0.129	0.070	0.150	0.0	0.0	1.00	25.00	0.079	0.012	10.00	23.69
105	0.070	0.060	0.020	0.230	0.102	0.070	0.150	0.0	0.0	1.00	25.00	0.079	0.012	10.00	27.32
106	0.070	0.060	0.020	0.230	0.091	0.070	0.150	0.0	0.0	1.00	25.00	0.079	0.012	10.00	27.69
107	0.070	0.060	0.020	0.230	0.098	0.070	0.150	0.0	0.0	1.00	25.00	0.079	0.012	10.00	25.67
108	0.070	0.060	0.020	0.230	0.110	0.070	0.150	0.0	0.0	1.00	25.00	0.079	0.012	10.00	25.47
109	0.070	0.060	0.020	0.230	0.294	0.070	0.150	0.0	0.0	1.00	25.00	0.079	0.012	10.00	13.05
110	0.070	0.040	0.020	0.230	0.338	0.050	0.120	0.0	0.0	1.00	20.00	0.079	0.012	3.50	10.42
111	0.070	0.060	0.020	0.230	0.191	0.070	0.150	0.0	0.0	1.00	25.00	0.079	0.012	8.50	14.49
112	0.070	0.060	0.020	0.230	0.126	0.070	0.150	0.0	0.0	1.00	25.00	0.079	0.012	8.50	21.43
113	0.070	0.060	0.020	0.230	0.183	0.070	0.150	0.0	0.0	1.00	25.00	0.079	0.012	8.50	16.51
114	0.070	0.060	0.020	0.230	0.163	0.070	0.150	0.0	0.0	1.00	75.00	0.079	0.012	8.50	15.42
115	0.070	0.060	0.020	0.230	0.312	0.070	0.150	0.0	0.0	1.00	75.00	0.079	0.012	8.50	11.05
116	0.070	0.060	0.020	0.230	0.134	0.070	0.150	0.0	0.0	1.00	75.00	0.079	0.012	8.50	18.64
117	0.070	0.300	0.020	0.230	0.130	0.070	0.150	0.0	0.0	1.00	110.00	0.079	0.012	8.50	18.13
118	0.070	0.300	0.020	0.230	0.180	0.070	0.150	0.0	0.0	1.00	110.00	0.079	0.012	8.50	16.18
119	0.070	0.300	0.020	0.230	0.250	0.070	0.150	0.0	0.0	1.00	110.00	0.079	0.012	8.50	12.04
120	0.070	0.300	0.020	0.180	0.108	0.020	0.070	0.0	0.0	1.00	110.00	0.079	0.012	8.50	25.75
121	0.070	0.300	0.020	0.180	0.113	0.020	0.070	0.0	0.0	0.50	110.00	0.079	0.012	8.50	24.18
122	0.070	0.300	0.020	0.180	0.109	0.020	0.070	0.0	0.0	0.50	75.00	0.079	0.012	8.50	24.16
123	0.070	0.300	0.020	0.180	0.095	0.020	0.070	0.0	0.0	0.50	75.00	0.079	0.012	7.50	26.80
124	0.070	0.300	0.020	0.180	0.126	0.020	0.070	0.0	0.0	0.50	75.00	0.079	0.012	7.50	22.34
125	0.070	0.300	0.020	0.180	0.092	0.020	0.070	0.0	0.0	0.50	40.00	0.079	0.012	7.50	27.72
126	0.070	0.300	0.020	0.180	0.096	0.020	0.070	0.0	0.0	0.50	40.00	0.079	0.012	7.50	26.92
127	0.070	0.300	0.020	0.180	0.106	0.020	0.070	0.0	0.0	0.50	40.00	0.079	0.012	7.50	25.96
128	0.070	0.300	0.020	0.180	0.188	0.020	0.070	0.0	0.0	0.50	40.00	0.079	0.012	7.50	14.28
129	0.070	0.060	0.020	0.180	0.102	0.020	0.070	0.0	0.0	0.50	40.00	0.079	0.012	7.50	25.49
130	0.070	0.060	0.020	0.180	0.090	0.020	0.070	0.0	0.0	0.50	40.00	0.079	0.012	7.50	27.56
131	0.070	0.060	0.020	0.180	0.080	0.020	0.070	0.0	0.0	1.00	20.00	0.079	0.012	7.50	29.16
132	0.070	0.060	0.020	0.180	0.087	0.020	0.070	0.0	0.0	1.00	20.00	0.079	0.012	7.50	26.81
133	0.070	0.060	0.020	0.180	0.107	0.020	0.070	0.0	0.0	1.00	20.00	0.079	0.012	7.50	22.62
134	0.070	0.060	0.020	0.180	0.096	0.020	0.070	0.0	0.0	1.00	20.00	0.079	0.012	7.50	23.67
135	0.070	0.060	0.020	0.180	0.199	0.020	0.070	0.0	0.0	1.00	20.00	0.079	0.012	7.50	11.68
136	0.070	0.060	0.020	0.180	0.129	0.020	0.070	0.0	0.0	1.00	20.00	0.079	0.012	7.50	19.20
137	0.070	0.060	0.020	0.180	0.143	0.020	0.070	0.0	0.0	1.00	20.00	0.079	0.012	7.50	17.28
138	0.070	0.040	0.020	0.180	0.127	0.020	0.070	0.0	0.0	1.00	20.00	0.079	0.012	7.50	16.99
139	0.070	0.040	0.020	0.180	0.128	0.020	0.070	0.0	0.0	2.50	20.00	0.079	0.012	7.50	16.72
140	0.070	0.040	0.020	0.180	0.150	0.070	0.070	0.0	0.0	2.50	20.00	0.079	0.012	10.00	16.06
141	0.070	0.040	0.020	0.180	0.200	0.070	0.070	0.0	0.0	2.50	20.00	0.079	0.012	10.00	13.94
142	0.070	0.040	0.020	0.230	0.181	0.050	0.120	0.0	0.0	1.00	20.00	0.079	0.012	3.50	14.18
143	0.070	0.040	0.020	0.230	0.249	0.050	0.120	0.0	0.0	1.00	20.00	0.079	0.012	3.50	11.79
144	0.070	0.040	0.020	0.230	0.306	0.050	0.120	0.0	0.0	1.00	20.00	0.079	0.012	3.50	10.66
145	0.070	0.040	0.020	0.230	0.309	0.050	0.120	0.0	0.0	1.00	20.00	0.079	0.012	3.50	10.07
146	0.070	0.040	0.020	0.230	0.266	0.050	0.120	0.0	0.0	1.00	20.00	0.079	0.012	3.50	7.57
147	0.070	0.040	0.020	0.230	0.482	0.050	0.120	0.0	0.0	1.00	20.00	0.079	0.012	3.50	7.56
148	0.070	0.040	0.020	0.230	0.101	0.050	0.120	0.0	0.0	1.00	20.00	0.079	0.012	3.50	16.86
149	0.070	0.040	0.020	0.230	0.057	0.050	0.120	0.0	0.0	1.00	20.00	0.079	0.012	3.50	17.03
150	0.070	0.040	0.020	0.230	0.129	0.050	0.120	0.0	0.0	1.00	20.00	0.079	0.012	3.50	13.92
151	0.070	0.040	0.020	0.230	0.565	0.050	0.120	0.0	0.0	1.00	20.00	0.079	0.012	3.50	6.44
152	0.070	0.040	0.020	0.230	0.147	0.050	0.120	0.0	0.0	1.00	20.00	0.079	0.012	3.50	10.85
153	0.070	0.040	0.020	0.230	0.164	0.050	0.120	0.0	0.0	1.00	20.00	0.079	0.012	3.50	12.01
154	0.070	0.040	0.020	0.230	0.150	0.050	0.120	0.0	0.0	1.00	20.00	0.079	0.012	3.50	11.46
155	0.070	0.040	0.020	0.230	0.257	0.050	0.120	0.0	0.0	1.00	20.00	0.079	0.012	3.50	7.96
156	0.070	0.040	0.020	0.230	0.106	0.050	0.120	0.0	0.0	1.00	20.00	0.079	0.012	3.50	15.83

TEMPERATURE CORRECTION FACTORS , THETA

1.047	1.085	1.160	1.047	1.025	1.000	1.000	1.000	1.000	1.050	1.000	1.085	1.085	1.000	1.000

SECTION 2.3 SPECIFY WASTEWATER AND TRIBUTARY LOADS

TABLE OF ADJUSTMENT FACTORS
APPLIED TO THE FOLLOWING WASTE SOURCE TYPES

INDUSTRY

NODE	CONST1	CONST2	CONST3	CONST4	CONST5
1	1.00	1.00	1.00	0.0	1.00
2	1.00	1.00	1.00	0.0	1.00
3	1.00	1.00	1.00	0.0	1.00
4	1.00	1.00	1.00	0.0	1.00
5	1.00	1.00	1.00	0.0	1.00
6	1.00	1.00	1.00	0.0	1.00
7	1.00	1.00	1.00	0.0	1.00
8	1.00	1.00	1.00	0.0	1.00
9	1.00	1.00	1.00	0.0	1.00
10	1.00	1.00	1.00	0.0	1.00
11	1.00	1.00	1.00	0.0	1.00
12	1.00	1.00	1.00	0.0	1.00
13	1.00	1.00	1.00	0.0	1.00
14	1.00	1.00	1.00	0.0	1.00
15	1.00	1.00	1.00	0.0	1.00
16	1.00	1.00	1.00	0.0	1.00
17	1.00	1.00	1.00	0.0	1.00
18	1.00	1.00	1.00	0.0	1.00
19	1.00	1.00	1.00	0.0	1.00
20	1.00	1.00	1.00	0.0	1.00
21	1.00	1.00	1.00	0.0	1.00
22	1.00	1.00	1.00	0.0	1.00
23	1.00	1.00	1.00	0.0	1.00
24	1.00	1.00	1.00	0.0	1.00
25	1.00	1.00	1.00	0.0	1.00
26	1.00	1.00	1.00	0.0	1.00
27	1.00	1.00	1.00	0.0	1.00
28	1.00	1.00	1.00	0.0	1.00
29	1.00	1.00	1.00	0.0	1.00
30	1.00	1.00	1.00	0.0	1.00
31	1.00	1.00	1.00	0.0	1.00
32	1.00	1.00	1.00	0.0	1.00
33	1.00	1.00	1.00	0.0	1.00
34	1.00	1.00	1.00	0.0	1.00
35	1.00	1.00	1.00	0.0	1.00
36	1.00	1.00	1.00	0.0	1.00
37	1.00	1.00	1.00	0.0	1.00
38	1.00	1.00	1.00	0.0	1.00
39	1.00	1.00	1.00	0.0	1.00
40	1.00	1.00	1.00	0.0	1.00
41	1.00	1.00	1.00	0.0	1.00

42	1.00	1.00	1.00	0.0	1.00
43	1.00	1.00	1.00	0.0	1.00
44	1.00	1.00	1.00	0.0	1.00
45	1.00	1.00	1.00	0.0	1.00
46	1.00	1.00	1.00	0.0	1.00
47	1.00	1.00	1.00	0.0	1.00
48	1.00	1.00	1.00	0.0	1.00
49	1.00	1.00	1.00	0.0	1.00
50	1.00	1.00	1.00	0.0	1.00
51	1.00	1.00	1.00	0.0	1.00
52	1.00	1.00	1.00	0.0	1.00
53	1.00	1.00	1.00	0.0	1.00
54	1.00	1.00	1.00	0.0	1.00
55	1.00	1.00	1.00	0.0	1.00
56	1.00	1.00	1.00	1.00	1.00
57	1.00	1.00	1.00	1.00	1.00
58	1.00	1.00	1.00	0.0	1.00
59	1.00	1.00	1.00	0.0	1.00
60	1.00	1.00	1.00	0.0	1.00
61	1.00	1.00	1.00	0.0	1.00
62	1.00	1.00	1.00	0.0	1.00
63	1.00	1.00	1.00	0.0	1.00
64	1.00	1.00	1.00	0.0	1.00
65	1.00	1.00	1.00	0.0	1.00
66	1.00	1.00	1.00	0.0	1.00
67	1.00	1.00	1.00	0.0	1.00
68	1.00	1.00	1.00	0.0	1.00
69	1.00	1.00	1.00	0.0	1.00
70	1.00	1.00	1.00	0.0	1.00
71	1.00	1.00	1.00	0.0	1.00
72	1.00	1.00	1.00	0.0	1.00
73	1.00	1.00	1.00	0.0	1.00
74	1.00	1.00	1.00	0.0	1.00
75	1.00	1.00	1.00	0.0	1.00
76	1.00	1.00	1.00	0.0	1.00
77	1.00	1.00	1.00	0.0	1.00
78	1.00	1.00	1.00	0.0	1.00
79	1.00	1.00	1.00	0.0	1.00
80	1.00	1.00	1.00	0.0	1.00
81	1.00	1.00	1.00	0.0	1.00
82	1.00	1.00	1.00	0.0	1.00
83	1.00	1.00	1.00	0.0	1.00
84	1.00	1.00	1.00	0.0	1.00
85	1.00	1.00	1.00	0.0	1.00
86	1.00	1.00	1.00	0.0	1.00
87	1.00	1.00	1.00	1.00	1.00
88	1.00	1.00	1.00	1.00	1.00
89	1.00	1.00	1.00	0.0	1.00
90	1.00	1.00	1.00	0.0	1.00
91	1.00	1.00	1.00	0.0	1.00
92	1.00	1.00	1.00	0.0	1.00
93	1.00	1.00	1.00	0.0	1.00
94	1.00	1.00	1.00	0.0	1.00
95	1.00	1.00	1.00	0.0	1.00
96	1.00	1.00	1.00	0.0	1.00
97	1.00	1.00	1.00	0.0	1.00
98	1.00	1.00	1.00	0.0	1.00
99	1.00	1.00	1.00	0.0	1.00
100	1.00	1.00	1.00	0.0	1.00
101	1.00	1.00	1.00	0.0	1.00
102	1.00	1.00	1.00	0.0	1.00

103	1.00	1.00	1.00	0.0	1.00
104	1.00	1.00	1.00	0.0	1.00
105	1.00	1.00	1.00	0.0	1.00
106	1.00	1.00	1.00	0.0	1.00
107	1.00	1.00	1.00	0.0	1.00
108	1.00	1.00	1.00	0.0	1.00
109	1.00	1.00	1.00	0.0	1.00
110	1.00	1.00	1.00	0.0	1.00
111	1.00	1.00	1.00	0.0	1.00
112	1.00	1.00	1.00	0.0	1.00
113	1.00	1.00	1.00	0.0	1.00
114	1.00	1.00	1.00	0.0	1.00
115	1.00	1.00	1.00	0.0	1.00
116	1.00	1.00	1.00	0.0	1.00
117	1.00	1.00	1.00	0.0	1.00
118	1.00	1.00	1.00	1.00	1.00
119	1.00	1.00	1.00	1.00	1.00
120	1.00	1.00	1.00	1.00	1.00
121	1.00	1.00	1.00	1.00	1.00
122	1.00	1.00	1.00	1.00	1.00
123	1.00	1.00	1.00	1.00	1.00
124	1.00	1.00	1.00	1.00	1.00
125	1.00	1.00	1.00	1.00	1.00
126	1.00	1.00	1.00	1.00	1.00
127	1.00	1.00	1.00	1.00	1.00
128	1.00	1.00	1.00	1.00	1.00
129	1.00	1.00	1.00	1.00	1.00
130	1.00	1.00	1.00	1.00	1.00
131	1.00	1.00	1.00	1.00	1.00
132	1.00	1.00	1.00	1.00	1.00
133	1.00	1.00	1.00	1.00	1.00
134	1.00	1.00	1.00	1.00	1.00
135	1.00	1.00	1.00	1.00	1.00
136	1.00	1.00	1.00	1.00	1.00
137	1.00	1.00	1.00	1.00	1.00
138	1.00	1.00	1.00	1.00	1.00
139	1.00	1.00	1.00	1.00	1.00
140	1.00	1.00	1.00	1.00	1.00
141	1.00	1.00	1.00	1.00	1.00
142	1.00	1.00	1.00	0.0	1.00
143	1.00	1.00	1.00	0.0	1.00
144	1.00	1.00	1.00	0.0	1.00
145	1.00	1.00	1.00	0.0	1.00
146	1.00	1.00	1.00	0.0	1.00
147	1.00	1.00	1.00	0.0	1.00
148	1.00	1.00	1.00	0.0	1.00
149	1.00	1.00	1.00	0.0	1.00
150	1.00	1.00	1.00	0.0	1.00
151	1.00	1.00	1.00	0.0	1.00
152	1.00	1.00	1.00	0.0	1.00
153	1.00	1.00	1.00	0.0	1.00
154	1.00	1.00	1.00	0.0	1.00
155	1.00	1.00	1.00	0.0	1.00
156	1.00	1.00	1.00	0.0	1.00

SUMMARY OF POINT SOURCE INPUTS

SIMULATION PERIOD : JULY 12 -23, 1976

CONSTITUENT 1 IS NORG (MG/L)

CONSTITUENT 2 IS NH3 (MG/L)

CONSTITUENT 3 IS NO3 (MG/L)

CONSTITUENT 4 IS CBOD (MG/L)

CONSTITUENT 5 IS DO (MG/L)

MUNICIPAL AND INDUSTRIAL WASTEWATER AND TRIBUTARY INFLOW BY NODE

INPUT NODE	NAME OF DISCHARGE	TYPE OF DISCHARGE	******* FLOW ******* MGD	CFS	UNADJUSTED CONC (MG/L) * ADJ. FACTORS CONST1	CONST2	CONST3	CONST4	CONST5	ADJUSTED INPUT LOADS - 1000 LB/DAY CONST1	CONST2	CONST3	CONST4	CONST5
14	SALEMCTY	MUN	-2.80		2.10	8.50	0.0	48.00	5.30					
				-4.34	1.00	1.00	1.00	1.45	1.00	0.05	0.20	0.0	1.63	0.12
	NODE TOTAL			-4.34						0.05	0.20	0.0	1.63	0.12
17	SALEM	IRIR	-2.39		0.0	0.0	0.0	5.50	0.0					
				-3.70	1.00	1.00	1.00	1.45	1.00	0.0	0.0	0.0	0.16	0.0
	NODE TOTAL			-3.70						0.0	0.0	0.0	0.16	0.0
21	GETTYOIL	IND	-8.00		20.00	37.30	0.90	0.0	3.00					
				-12.40	1.00	1.00	1.00	1.90	1.00	1.34	2.49	0.06	0.0	0.20
	NODE TOTAL			-12.40						1.34	2.49	0.06	0.0	0.20
22	AMOCO	IND	-0.60		1.00	17.00	0.0	0.0	0.0					
				-0.93	1.00	1.00	1.00	1.90	1.00	0.01	0.09	0.0	0.0	0.0
	NODE TOTAL			-0.93						0.01	0.09	0.0	0.0	0.0
23	PENNSYLP	MUN	-0.90		12.00	29.00	0.0	129.70	0.0					
				-1.39	1.00	1.00	1.00	1.45	1.00	0.09	0.22	0.0	1.41	0.0
	NODE TOTAL			-1.39						0.09	0.22	0.0	1.41	0.0

24	DPCHAMBR	IND	-100.00		5.00	12.00	13.00	0.0	4.00					
				-155.00	1.00	1.00	1.00	1.45	1.00	4.17	10.02	10.85	0.0	3.34
24	ICI 1	IND	-2.60		1.80	0.20	1.80	0.0	4.00					
				-4.03	1.00	1.00	1.00	1.45	1.00	0.04	0.00	0.04	0.0	0.09
24	ICI 7	IND	-1.10		1.50	0.20	2040.00	0.0	5.00					
				-1.70	1.00	1.00	1.00	1.45	1.00	0.01	0.00	18.73	0.0	0.05
24	ICI 8	IND	-0.10		0.70	0.20	1.80	0.0	6.00					
				-0.15	1.00	1.00	1.00	1.45	1.00	0.00	0.00	0.00	0.0	0.01
24	ICI 13	IND	-0.90		21.00	72.00	0.90	0.0	1.00					
				-1.39	1.00	1.00	1.00	1.45	1.00	0.16	0.54	0.01	0.0	0.01
	NODE TOTAL			-162.28						4.38	10.56	29.63	0.0	3.48
25	UPENSNCK	MUN	-0.50		0.0	0.0	0.0	128.10	0.0					
				-0.77	1.00	1.00	1.00	1.45	1.00	0.0	0.0	0.0	0.78	0.0
	NODE TOTAL			-0.77						0.0	0.0	0.0	0.78	0.0
26	WLMINGTN	MUN	-70.50		7.00	13.00	2.30	16.00	4.00					
				-109.27	1.00	1.00	1.00	1.45	1.00	4.12	7.65	1.35	13.65	2.35
26	DPEDGMOR	IND	-8.00		1.00	0.30	1.90	0.0	5.00					
				-12.40	1.00	1.00	1.00	1.90	1.00	0.07	0.02	0.13	0.0	0.33
	NODE TOTAL			-121.67						4.19	7.67	1.48	13.65	2.69
29	PHOENIX	IND	-11.00		1.09	2.51	1.97	0.0	0.0					
				-17.05	1.00	1.00	1.00	1.90	1.00	0.10	0.23	0.18	0.0	0.0
29	ALLOCHEM	IND	-24.40		1.20	1.50	2.00	0.0	2.00					
				-37.82	1.00	1.00	1.00	1.90	1.00	0.24	0.31	0.41	0.0	0.41
	NODE TOTAL			-54.87						0.34	0.54	0.59	0.0	0.41
30	MARCUSHK	MUN	-0.60		22.97	15.98	2.00	137.70	0.0					
				-0.93	1.00	1.00	1.00	1.45	1.00	0.12	0.08	0.01	1.00	0.0
30	SUNOIL 1	IND	-74.80		2.50	2.90	2.80	0.0	3.00					
				-114.70	1.00	1.00	1.00	1.90	1.00	1.54	1.79	1.73	0.0	1.85
30	EMC	IND	-2.50		1.30	0.20	2.80	0.0	6.00					
				-3.87	1.00	1.00	1.00	1.45	1.00	0.03	0.00	0.06	0.0	0.13
30	BP 201	IND	-2.20		3.00	3.00	0.50	0.0	4.00					
				-3.41	1.00	1.00	1.00	1.90	1.00	0.06	0.06	0.01	0.0	0.07
30	BP 101	IND	-74.00		1.00	0.30	2.50	0.0	3.00					
				-114.70	1.00	1.00	1.00	1.90	1.00	0.62	0.19	1.54	0.0	1.85
30	BP 002	IND	-38.00		1.00	0.40	2.50	0.0	4.00					
				-58.90	1.00	1.00	1.00	1.90	1.00	0.32	0.13	0.79	0.0	1.27
	NODE TOTAL			-296.51						2.68	2.24	4.14	1.00	5.17
31	CHESTER	MUN	-8.80		4.80	15.60	1.10	144.00	1.00					
				-13.64	1.00	1.00	1.00	1.45	1.00	0.35	1.15	0.08	15.23	0.07

	NODE TOTAL			-13.64						0.35	1.15	0.08	15.23	0.07
32	CHESTER	TRIB	-25.81		1.00	0.30	6.30	2.70	8.00					
				-40.00	1.00	1.00	1.00	1.45	1.00	0.22	0.06	1.36	0.84	1.72
32	SCOTT 2	IND	-6.70		7.00	0.20	2.40	0.0	7.00					
				-10.38	1.00	1.00	1.00	1.90	1.00	0.39	0.01	0.13	0.0	0.39
32	SCOTT 3	IND	-7.50		9.00	0.10	2.00	0.0	7.00					
				-11.62	1.00	1.00	1.00	1.90	1.00	0.56	0.01	0.13	0.0	0.44
32	SCOTT 4	IND	-3.90		8.00	0.17	2.20	0.0	7.00					
				-6.04	1.00	1.00	1.00	1.90	1.00	0.26	0.01	0.07	0.0	0.23
	NODE TOTAL			-68.05						1.43	0.09	1.69	0.84	2.78
34	UCARBIDE	IND	-2.60		1.90	13.91	3.90	0.0	2.50					
				-4.03	1.00	1.00	1.00	1.90	1.00	0.04	0.30	0.08	0.0	0.05
	NODE TOTAL			-4.03						0.04	0.30	0.08	0.0	0.05
38	PHILA SW	MUN	-140.00		5.00	6.20	0.61	44.00	4.00					
				-217.00	1.00	1.00	1.00	1.45	1.00	5.84	7.24	0.71	74.55	4.67
	NODE TOTAL			-217.00						5.84	7.24	0.71	74.55	4.67
44	PHILA SE	MUN	-131.00		6.00	2.10	1.40	89.00	4.00					
				-203.05	1.00	1.00	1.00	1.45	1.00	6.56	2.30	1.53	141.11	4.37
	NODE TOTAL			-203.05						6.56	2.30	1.53	141.11	4.37
46	AMSTAR 1	IND	-1.90		1.60	0.50	1.60	0.0	3.60					
				-2.94	1.00	1.00	1.00	1.45	1.00	0.03	0.01	0.03	0.0	0.06
46	AMSTAR 3	IND	-23.60		1.20	0.40	1.60	0.0	3.50					
				-36.58	1.00	1.00	1.00	1.45	1.00	0.24	0.08	0.32	0.0	0.69
	NODE TOTAL			-39.52						0.26	0.09	0.34	0.0	0.75
48	NATSUGAR	IND	-15.80		2.00	0.30	0.70	0.0	2.00					
				-24.49	1.00	1.00	1.00	1.45	1.00	0.26	0.04	0.09	0.0	0.26
	NODE TOTAL			-24.49						0.26	0.04	0.09	0.0	0.26
51	PHILA NE	MUN	-172.00		8.00	9.90	0.50	65.00	2.60					
				-266.60	1.00	1.00	1.00	1.45	1.00	11.49	14.21	0.72	135.31	3.73
	NODE TOTAL			-266.60						11.49	14.21	0.72	135.31	3.73

56	PENYPACK	TRIB	-3.23		1.00	0.10	3.20	1.00	10.40					
				-5.00	1.00	1.00	1.00	1.45	1.00	0.03	0.00	0.09	0.04	0.28
	NODE TOTAL			-5.00						0.03	0.00	0.09	0.04	0.28
89	PENSGROV	MUN	-0.30		0.0	0.0	0.0	25.60	0.0					
				-0.46	1.00	1.00	1.00	1.45	1.00	0.0	0.0	0.0	0.09	0.0
	NODE TOTAL			-0.46						0.0	0.0	0.0	0.09	0.0
91	OLDMANS	TRIB	-31.16		1.00	0.14	1.24	3.40	5.00					
				-48.30	1.00	1.00	1.00	1.45	1.00	0.26	0.04	0.32	1.28	1.30
	NODE TOTAL			-48.30						0.26	0.04	0.32	1.28	1.30
93	MONSANTO	IND	-1.80		25.00	44.00	0.0	0.0	1.00					
				-2.79	1.00	1.00	1.00	1.90	1.00	0.38	0.66	0.0	0.0	0.02
	NODE TOTAL			-2.79						0.38	0.66	0.0	0.0	0.02
97	DPRPAUNO	IND	-15.00		2.00	5.00	22.00	0.0	6.00					
				-23.25	1.00	1.00	1.00	1.90	1.00	0.25	0.63	2.75	0.0	0.75
	NODE TOTAL			-23.25						0.25	0.63	2.75	0.0	0.75
98	HUPCULES	IND	-0.60		0.0	0.0	0.0	0.0	0.0					
				-0.93	1.00	1.00	1.00	1.90	1.00	0.0	0.0	0.0	0.0	0.0
	NODE TOTAL			-0.93						0.0	0.0	0.0	0.0	0.0
99	MOBILCP1	IND	-13.30		2.00	0.0	6.00	0.0	5.00					
				-20.61	1.00	1.00	1.00	1.90	1.00	0.22	0.0	0.67	0.0	0.56
99	MOBILNY2	IND	-4.70		1.25	2.50	10.15	0.0	3.80					
				-7.28	1.00	1.00	1.00	1.90	1.00	0.05	0.10	0.40	0.0	0.15
99	MOBILIW3	IND	-4.30		0.0	29.00	0.0	0.0	0.0					
				-6.66	1.00	1.00	1.00	1.90	1.00	0.0	1.04	0.0	0.0	0.0
	NODE TOTAL			-34.56						0.27	1.14	1.06	0.0	0.70
100	GLOSTRCO	MUN	-11.40		2.40	5.70	5.80	9.00	5.00					
				-17.67	1.00	1.00	1.00	1.45	1.00	0.24	0.54	0.55	1.24	0.48
100	PAULSMRO	MUN	-1.30		0.0	26.93	0.0	64.00	0.0					
				-2.01	1.00	1.00	1.00	1.45	1.00	0.0	0.29	0.0	1.01	0.0
100	SHELL	IND	-1.90		19.19	3.71	0.0	0.0	0.0					
				-2.94	1.00	1.00	1.00	1.90	1.00	0.30	0.06	0.0	0.0	0.0
100	OLINCHEM	IND	-17.40		0.0	2.06	0.0	0.0	0.0					
				-26.97	1.00	1.00	1.00	1.90	1.00	0.0	0.30	0.0	0.0	0.0

100	MANTUA	TRIB	-7.10	-11.00	0.0	5.06	0.68	4.70	0.0	0.0	0.30	0.04	0.40	0.0
	NODE TOTAL			-60.60						0.53	1.49	0.59	2.65	0.48
101	WOODBURY	MUN	-1.90	-2.94	0.0	1.24	0.0	85.40	0.0	0.0	0.02	0.0	1.96	0.0
101	MAT PARK	MUN	-0.60	-0.93	0.0	3.71	0.0	64.00	0.0	0.0	0.02	0.0	0.46	0.0
	NODE TOTAL			-3.87						0.0	0.04	0.0	2.43	0.0
103	TEXACO	IND	-4.40	-6.82	1.60	0.0	4.70	0.0	5.00	0.06	0.0	0.17	0.0	0.18
	NODE TOTAL			-6.82						0.06	0.0	0.17	0.0	0.18
104	BELLMAWR	MUN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
104	BRUCLAWN	MUN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
104	STEPHAM	MUN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
104	GLOUSTCY	MUN	-3.00	-4.65	1.00	1.00	1.00	1.45	1.00	0.0	0.0	0.0	0.0	0.0
104	HAPSHUW	IND	-0.60	-0.93	1.00	1.00	1.00	1.45	1.00	0.13	0.35	0.0	1.96	0.0
104	GAF	IND	-11.00	-17.05	1.00	1.00	1.00	1.45	1.00	0.0	0.0	0.0	0.0	0.0
104	NJ ZINC	IND	-4.00	-6.20	1.00	1.00	1.00	1.90	1.00	0.17	0.0	0.0	0.0	0.0
104	BIGTIMBR	TRIB	-45.16	-70.00	1.00	1.00	1.00	1.90	1.00	0.05	0.02	0.0	0.0	0.07
	NODE TOTAL			-98.83						0.68	0.32	0.64	2.73	2.11
106	CAMDEN M	MUN	-26.00	-40.30	16.00	10.00	0.0	150.00	1.00	3.47	2.17	0.0	47.20	0.22
106	MCANDLES	IND	-1.30	-2.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	NODE TOTAL			-42.31						3.47	2.17	0.0	47.20	0.22
113	PENSAUKN	MUN	-4.20	-6.51	7.00	17.00	0.0	102.00	0.0	0.25	0.60	0.0	8.23	0.0
113	GEORGPAC	IND	-0.80	-1.24	6.00	0.10	0.10	0.0	1.00	0.04	0.00	0.00	0.0	0.01
	NODE TOTAL			-7.75						0.29	0.60	0.00	8.23	0.01

116	PALMYRA	MUN	-0.40	-0.62	4.90	32.40	3.50	47.60	3.50	0.02	0.11	0.01	0.23	0.01
					1.00	1.00	1.00	1.45	1.00					
	NODE TOTAL			-0.62						0.02	0.11	0.01	0.23	0.01
118	CINAMNSN	MUN	-2.00	-3.10	8.00	16.00	0.0	30.00	3.00	0.13	0.27	0.0	0.73	0.05
					1.00	1.00	1.00	1.45	1.00					
	NODE TOTAL			-3.10						0.13	0.27	0.0	0.73	0.05
125	BRLINGTN	MUN	-1.20	-1.86	9.00	4.00	0.0	150.00	0.0	0.09	0.04	0.0	2.18	0.0
					1.00	1.00	1.00	1.45	1.00					
125	TENNECO	IND	-1.30	-2.01	6.00	18.00	3.10	34.50	3.30	0.07	0.20	0.03	0.54	0.04
					1.00	1.00	1.00	1.45	1.00					
	NODE TOTAL			-3.87						0.16	0.24	0.03	2.72	0.04
126	BRSTLTWP	MUN	-1.70	-2.63	12.00	15.00	0.80	20.00	2.00	0.17	0.21	0.01	0.41	0.03
					1.00	1.00	1.00	1.45	1.00					
	NODE TOTAL			-2.63						0.17	0.21	0.01	0.41	0.03
127	BRSTLBRO	MUN	-1.70	-2.63	4.00	8.00	2.80	42.00	7.00	0.06	0.11	0.04	0.86	0.10
					1.00	1.00	1.00	1.45	1.00					
127	KUHN&HAS	IND	-1.00	-1.55	8.00	0.10	0.40	22.00	5.00	0.07	0.00	0.00	0.27	0.04
					1.00	1.00	1.00	1.45	1.00					
127	UTIERCRK	TRIB	-3.23	-5.00	0.0	0.0	0.0	12.30	0.0	0.0	0.0	0.0	0.48	0.0
					1.00	1.00	1.00	1.45	1.00					
	NODE TOTAL			-9.18						0.12	0.11	0.04	1.61	0.14
128	ASSISCNK	TRIB	-3.23	-5.00	0.0	0.0	0.0	12.30	0.0	0.0	0.0	0.0	0.48	0.0
					1.00	1.00	1.00	1.45	1.00					
	NODE TOTAL			-5.00						0.0	0.0	0.0	0.48	0.0
131	FLORENCE	MUN	-0.60	-0.93	3.71	11.14	0.0	64.00	5.00	0.02	0.06	0.0	0.46	0.03
					1.00	1.00	1.00	1.45	1.00					
131	LWRBUCKS	MUN	-7.90	-12.24	5.00	20.00	0.50	18.00	3.60	0.33	1.32	0.03	1.72	0.24
					1.00	1.00	1.00	1.45	1.00					
131	BRIPARCH	IND	-3.20	-4.96	22.29	0.37	0.0	12.80	0.0	0.60	0.01	0.0	0.50	0.0
					1.00	1.00	1.00	1.45	1.00					
131	MARTINS	TRIB	-5.48	-8.50	0.0	0.0	0.0	3.60	0.0	0.0	0.0	0.0	0.24	0.0
					1.00	1.00	1.00	1.45	1.00					
	NODE TOTAL			-26.63						0.94	1.38	0.03	2.92	0.26

134	USSKODML	IND	-7.00		1.00	2.80	1.20	2.00	6.00					
				-10.85	1.00	1.00	1.00	0.0	1.00	0.06	0.16	0.07	0.0	0.35
134	USSTRMTP	IND	-61.30		1.00	2.30	1.50	2.00	5.00					
				-95.01	1.00	1.00	1.00	1.45	1.00	0.51	1.18	0.77	1.48	2.56
	NODE TOTAL			-105.86						0.57	1.34	0.84	1.48	2.91
137	BORDENTN	MUN	-1.00		3.60	14.60	0.0	48.30	5.00					
				-1.55	1.00	1.00	1.00	1.45	1.00	0.03	0.12	0.0	0.58	0.04
	NODE TOTAL			-1.55						0.03	0.12	0.0	0.58	0.04
140	TRENTON	MUN	-19.00		6.00	45.00	0.0	90.00	1.00					
				-29.45	1.00	1.00	1.00	1.45	1.00	0.95	7.14	0.0	20.70	0.16
	NODE TOTAL			-29.45						0.95	7.14	0.0	20.70	0.16
141	MORRISVL	MUN	-3.70		1.00	31.50	1.81	18.00	7.40					
				-5.73	1.00	1.00	1.00	1.45	1.00	0.03	0.97	0.06	0.81	0.23
141	ASSNPINK	TRIB	-65.81		0.80	0.67	2.40	3.00	7.20					
				-102.00	1.00	1.00	1.00	1.45	1.00	0.44	0.37	1.32	2.39	3.95
	NODE TOTAL			-107.73						0.47	1.34	1.37	3.20	4.18
145	CHRISTNA	TRIB	-148.39		1.00	0.23	1.52	4.50	4.00					
				-230.00	1.00	1.00	1.00	1.45	1.00	1.24	0.28	1.88	8.08	4.95
	NODE TOTAL			-230.00						1.24	0.28	1.88	8.08	4.95
146	BRANDYWN	TRIB	-304.97		0.84	0.06	2.09	9.60	8.20					
				-472.70	1.00	1.00	1.00	1.45	1.00	2.14	0.15	5.32	35.43	20.87
	NODE TOTAL			-472.70						2.14	0.15	5.32	35.43	20.87
147	CUCA	MUN	-8.00		2.00	20.00	0.80	50.00	3.00					
				-12.40	1.00	1.00	1.00	1.45	1.00	0.13	1.34	0.05	4.84	0.20
147	DRBYCRSA	MUN	-11.10		3.00	21.70	1.50	32.00	3.00					
				-17.20	1.00	1.00	1.00	1.45	1.00	0.28	2.01	0.18	4.30	0.28
147	MUKNPATS	MUN	-5.00		2.00	12.00	5.80	20.00	2.60					
				-7.75	1.00	1.00	1.00	1.45	1.00	0.08	0.50	0.24	1.21	0.11
147	TINICUM	MUN	0.0		0.0	0.0	0.0	0.0	0.0					
				0.0	1.00	1.00	1.00	1.45	1.00	0.0	0.0	0.0	0.0	0.0
147	DARBY	TRIB	-18.06		1.00	1.20	2.20	3.70	3.00					
				-28.00	1.00	1.00	1.00	1.45	1.00	0.15	0.18	0.33	0.81	0.45
	NODE TOTAL			-65.35						0.65	4.03	0.80	11.16	1.04

148	GULF OIL	IND	-9.30		2.80	1.90	12.00	0.0	4.60						
				-14.41	1.00	1.00	1.00	1.90	1.00	0.22	0.15	0.93	0.0	0.36
148	ARCO SPL	IND	-3.50		2.40	0.40	3.90	0.0	6.00					
				-5.42	1.00	1.00	1.00	1.90	1.00	0.07	0.01	0.11	0.0	0.18
148	ARCO WPL	IND	-0.10		2.00	3.00	0.50	0.0	3.00					
				-0.15	1.00	1.00	1.00	1.90	1.00	0.00	0.00	0.00	0.0	0.00
	NODE TOTAL			-19.99						0.29	0.16	1.05	0.0	0.53
149	ARCO NYD	IND	-2.20		2.00	0.40	0.70	0.0	1.60					
				-3.41	1.00	1.00	1.00	1.90	1.00	0.04	0.01	0.01	0.0	0.03
	NODE TOTAL			-3.41						0.04	0.01	0.01	0.0	0.03
150	SCHUYLKL	TRIB	-870.97		0.15	0.04	2.25	2.60	8.00					
				-1350.00	1.00	1.00	1.00	1.45	1.00	1.09	0.29	16.36	27.41	58.16
	NODE TOTAL			-1350.00						1.09	0.29	16.36	27.41	58.16
151	CAMDEN N	MUN	-3.20		12.00	25.00	0.0	108.00	0.0					
				-4.96	1.00	1.00	1.00	1.45	1.00	0.32	0.67	0.0	4.18	0.0
151	COOPER	TRIB	-28.39		1.80	3.00	1.30	6.00	4.40					
				-44.00	1.00	1.00	1.00	1.45	1.00	0.43	0.71	0.31	2.06	1.04
	NODE TOTAL			-48.96						0.75	1.38	0.31	6.24	1.04
152	MILLAUREL	MUN	0.0		0.0	0.0	0.0	0.0	0.0					
				0.0	1.00	1.00	1.00	1.45	1.00	0.0	0.0	0.0	0.0	0.0
152	PENSAUKN	TRIB	-11.61		1.50	2.00	1.70	6.40	3.00					
				-18.00	1.00	1.00	1.00	1.45	1.00	0.15	0.19	0.16	0.90	0.29
	NODE TOTAL			-18.00						0.15	0.19	0.16	0.90	0.29
153	WILLINGBO	MUN	-1.90		1.24	0.0	0.0	38.40	0.0					
				-2.94	1.00	1.00	1.00	1.45	1.00	0.02	0.0	0.0	0.88	0.0
153	RANCOCAS	TRIB	-154.84		1.20	0.20	1.40	3.50	7.00					
				-240.00	1.00	1.00	1.00	1.45	1.00	1.55	0.26	1.81	6.56	9.05
	NODE TOTAL			-242.94						1.57	0.26	1.81	7.44	9.05
154	FALLSIAP	MUN	-2.60		14.39	2.32	11.14	9.60	0.0					
				-4.03	1.00	1.00	1.00	1.45	1.00	0.31	0.05	0.24	0.30	0.0
154	NESHAMNY	TRIB	-100.26		1.04	0.12	3.00	1.70	8.30					
				-155.40	1.00	1.00	1.00	1.45	1.00	0.87	0.13	2.51	2.06	6.95
	NODE TOTAL			-159.43						1.18	0.18	2.75	2.36	6.95

155	HAMILTON	MUN	-8.60		5.00	25.00	3.00	18.00	4.00						
				-13.33	1.00	1.00	1.00	1.45	1.00	0.36	1.79	0.22	1.87	0.29
155	CROSWICK	TRIB	-40.65		0.80	0.14	1.24	3.00	7.00					
				-63.00	1.00	1.00	1.00	1.45	1.00	0.27	0.05	0.42	1.48	2.37
	NODE TOTAL			-76.33						0.63	1.84	0.64	3.35	2.66
156	NEWTON	TRIB	-3.87		4.20	1.05	1.30	1.70	2.70					
				-6.00	1.00	1.00	1.00	1.45	1.00	0.14	0.03	0.04	0.08	0.09
	NODE TOTAL			-6.00						0.14	0.03	0.04	0.08	0.09

SUMMARY OF DISCHARGE LOADS BY ZONE AND TYPE

INPUT ZONE	TYPE OF DISCHARGE	NUMBER OF DISCHARGES	ADJUSTED INPUT LOADS - 1000 LB/DAY					INPUT LOADS - PERCENT OF ZONE BY TYPE				
			CONST1	CONST2	CONST3	CONST4	CONST5	CONST1	CONST2	CONST3	CONST4	CONST5
1	MUN	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	IND	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	TRIB	1	11.61	2.90	29.03	156.32	385.62	100.00	100.00	100.00	100.00	100.00
- ZONE TOTAL		1	11.61	2.90	29.03	156.32	385.62	16.38	3.59	26.56	20.95	72.21
2	MUN	12	2.50	12.08	0.60	31.51	1.16	35.96	83.87	7.84	65.61	4.32
2	IND	5	1.30	1.55	0.87	2.79	2.99	18.64	10.73	11.48	5.81	11.17
2	TRIB	8	3.16	0.78	6.14	13.73	22.60	45.40	5.39	80.68	28.58	84.51
- ZONE TOTAL		25	6.96	14.41	7.62	48.02	26.74	9.82	17.83	6.97	6.44	5.01
3	MUN	11	22.23	20.40	2.26	338.22	8.34	91.10	93.58	58.72	98.32	64.36
3	IND	8	0.79	0.14	0.43	0.0	1.08	3.22	0.66	11.26	0.0	8.37
3	TRIB	4	1.39	1.26	1.16	5.77	3.53	5.68	5.76	30.02	1.68	27.27
ZONE TOTAL		23	24.40	21.80	3.85	344.00	12.95	34.42	26.98	3.52	46.10	2.43
4	MUN	11	7.03	13.19	1.83	105.81	5.81	50.62	67.76	6.19	78.22	7.78
4	IND	22	5.40	5.44	9.60	0.0	8.50	38.89	27.95	32.53	0.0	11.39
4	TRIB	4	1.46	0.84	18.09	29.46	60.33	10.48	4.29	61.28	21.78	80.83
- ZONE TOTAL		37	13.89	19.47	29.51	135.27	74.65	19.60	24.09	27.01	18.13	13.98
5	MUN	5	4.26	8.07	1.35	17.56	2.48	30.35	36.28	3.45	28.09	7.28
5	IND	10	6.14	13.70	30.40	0.0	4.43	43.73	61.59	77.40	0.0	13.00
5	TRIB	4	3.64	0.47	7.53	44.96	27.13	25.92	2.13	19.16	71.91	79.72
- ZONE TOTAL		19	14.03	22.24	39.28	62.52	34.03	19.79	27.51	35.94	8.38	6.37
- GRAND TOTAL		105	70.89	80.81	109.29	746.13	533.99					

SECTION 2.4 SPECIFY WATER QUALITY BOUNDARY CONDITIONS

SEAWARD BOUNDARY CONDITIONS

NODE 1 : COURTHOUSE PT , MARYLAND

' CIN1 ' PERIOD = 2400 CYCLES

START CYCLE	DURATION (CYCLES)	CONST1 (MG/L)	CONST2 (MG/L)	CONST3 (MG/L)	CONST4 (MG/L)	CONST5 (MG/L)
1	2400	0.30	0.30	1.00	2.90	7.00

NODE 2 : LISTON PT , DELAWARE

' CINMAX ' PERIOD = 2400 CYCLES

START CYCLE	DURATION (CYCLES)	CONST1 (MG/L)	CONST2 (MG/L)	CONST3 (MG/L)	CONST4 (MG/L)	CONST5 (MG/L)
1	2400	0.20	0.10	1.60	2.17	6.00

UPSTREAM BOUNDARY CONDITIONS

NODE 141 RECEIVES VARYING LOADS FROM DELAWARE (RIVR)

DISCHARGE PERIOD = 2400 CYCLES

START CYCLE	DURATION (CYCLES)	FLOW (CFS)	CONST1 (MG/L)	CONST2 (MG/L)	CONST3 (MG/L)	CONST4 (MG/L)	CONST5 (MG/L)
1	1100	-7880.00	0.28	0.07	0.70	3.77	9.30
1101	1300	-7880.00	0.28	0.07	0.70	3.77	8.30

SECTION 2.5 PRINT HYDRAULIC INPUTS

JUNCTION HEAD AND HYD. RADIUS AND X-SECTIONAL AREA OF CHANNELS ARE AT MEAN TIDE **

CHANNEL DATA

CHAN.	LENGTH	WIDTH	AREA	MANNING	NET FLOW	HYD. RADIUS	JUNC. AT ENDS	
1	7000.	2400.	33594.	0.010	3821.12	14.0	1	3
2	11000.	2850.	85122.	0.010	3821.13	29.9	3	4
3	11000.	650.	19492.	0.010	3821.14	30.0	4	5
4	11000.	600.	17931.	0.010	3821.18	29.9	5	6
5	11000.	600.	17868.	0.010	3821.18	29.8	6	7
6	11000.	600.	14808.	0.010	3821.25	24.7	7	8
7	11000.	600.	13540.	0.010	3821.31	22.6	8	9
8	15679.	600.	12389.	0.010	3821.36	20.6	9	10
9	14994.	12995.	247391.	0.012	-13833.30	19.0	2	11
10	14994.	11829.	213665.	0.012	-13833.52	18.1	11	12
11	14994.	7700.	138640.	0.012	-17287.04	18.0	12	13
12	11995.	4500.	88758.	0.010	3821.50	19.7	10	13
13	19326.	1700.	16174.	0.010	3453.79	9.5	12	14
14	7330.	7600.	86916.	0.010	6752.01	11.4	13	14
15	8996.	1000.	10604.	0.030	-3.12	10.6	14	15
16	8996.	4332.	39296.	0.015	-2.60	9.1	15	16
17	8996.	5331.	48365.	0.015	-1.14	9.1	16	17
18	13661.	3800.	62507.	0.010	5220.41	16.4	13	18
19	8996.	5600.	36778.	0.010	10209.19	6.6	14	19
20	13661.	3400.	78318.	0.010	-25434.84	23.0	13	20
21	10662.	6000.	58724.	0.010	5220.30	9.8	18	21
22	9663.	4900.	59142.	0.010	10209.45	12.1	19	20
23	10996.	7600.	113244.	0.010	5219.88	14.9	21	22
24	13994.	3900.	75153.	0.010	-15225.30	19.3	20	22
25	13661.	8996.	167500.	0.015	-10006.65	18.6	22	23
26	11995.	8274.	162578.	0.017	-10006.38	19.6	23	24
27	11995.	6942.	158036.	0.017	-10005.75	22.8	24	25
28	9330.	1000.	16075.	0.015	0.09	16.1	25	142
29	9330.	722.	8789.	0.015	0.04	12.2	142	143
30	9330.	389.	4308.	0.015	0.06	11.1	143	144
31	9330.	278.	2799.	0.015	0.10	10.1	144	145
32	9330.	389.	2952.	0.015	-0.01	7.6	142	146
33	7500.	3600.	40294.	0.020	588.48	11.2	25	89
34	12000.	2250.	43177.	0.020	-1609.82	19.2	25	58
35	7200.	2100.	73793.	0.020	-8983.88	35.1	25	26
36	5400.	900.	8271.	0.020	529.71	9.2	26	58
37	5700.	1200.	27844.	0.020	-1122.07	23.2	89	58
38	10500.	2400.	79581.	0.020	-9513.78	33.2	26	27
39	5600.	900.	20876.	0.020	-806.42	23.2	58	27
40	10500.	1800.	34574.	0.020	-764.25	19.2	58	59
41	10500.	2400.	43668.	0.020	-533.25	18.2	89	90
42	10200.	2100.	23557.	0.020	390.54	11.2	90	91
43	6000.	900.	24485.	0.020	923.56	27.2	90	59
44	5400.	900.	33481.	0.020	-6422.99	37.2	27	59
45	11100.	1800.	41768.	0.020	-2285.25	23.2	27	28
46	5900.	900.	38891.	0.020	4506.45	43.2	59	28
47	10500.	1500.	37829.	0.017	-3604.17	25.2	59	60

JUNCTION DATA

JUNC.	INFLOW	HEAD	CHANNELS ENTERING JUNCTION				
1	0.0	0.10	1	0	0	0	0
2	0.0	-0.07	9	0	0	0	0
3	0.0	0.10	1	2	0	0	0
4	0.0	0.10	2	3	0	0	0
5	0.0	0.10	3	4	0	0	0
6	0.0	0.10	4	5	0	0	0
7	0.0	0.09	5	6	0	0	0
8	0.0	0.09	6	7	0	0	0
9	0.0	0.08	7	8	0	0	0
10	0.0	0.05	8	12	0	0	0
11	0.0	-0.04	9	10	0	0	0
12	0.0	-0.01	10	11	13	0	0
13	0.0	0.05	11	12	14	18	20
14	0.0	0.06	13	14	15	19	0
15	0.0	0.19	15	16	0	0	0
16	0.0	0.19	16	17	0	0	0
17	0.0	0.19	17	0	0	0	0
18	0.0	0.07	18	21	0	0	0
19	0.0	0.08	19	22	0	0	0
20	0.0	0.08	20	22	24	0	0
21	0.0	0.12	21	23	0	0	0
22	0.0	0.13	23	24	25	0	0
23	0.0	0.16	25	26	0	0	0
24	0.0	0.18	26	27	0	0	0
25	0.0	0.20	27	28	33	34	35
26	0.0	0.21	36	35	38	0	0
27	0.0	0.22	38	39	44	45	0
28	0.0	0.23	45	46	53	0	0
29	0.0	0.25	52	53	54	55	0
30	0.0	0.25	54	59	60	61	0
31	0.0	0.26	60	65	66	67	0
32	0.0	0.27	67	68	72	73	0
33	0.0	0.28	73	74	81	82	0
34	0.0	0.29	82	83	245	0	0
35	0.0	0.30	83	89	0	0	0
36	0.0	0.32	89	93	94	95	0
37	0.0	0.33	94	100	102	101	0
38	0.0	0.33	101	106	107	108	0
39	0.0	0.33	107	111	112	113	246
40	0.0	0.33	112	117	118	119	0
41	0.0	0.34	118	123	124	125	0
42	0.0	0.35	124	128	129	130	0
43	0.0	0.35	129	131	137	138	0
44	0.0	0.35	138	139	144	145	0
45	0.0	0.36	145	146	150	151	0
46	0.0	0.36	151	152	156	157	0
47	0.0	0.37	157	158	161	165	0

48	5400.	900.	19106.	0.017	44.95	21.2	91	60
49	10500.	1700.	13996.	0.017	435.72	8.2	91	92
50	5400.	900.	19105.	0.017	-312.18	21.2	60	92
51	10500.	1500.	57343.	0.017	-4859.29	38.2	60	61
52	5400.	600.	19933.	0.017	-1522.69	33.2	60	29
53	10500.	2100.	57158.	0.017	-6791.41	27.2	28	29
54	9400.	1200.	35072.	0.025	-1784.56	29.2	29	30
55	5500.	700.	30258.	0.025	-3484.16	43.2	29	61
56	9400.	1500.	27348.	0.025	123.62	18.2	92	93
57	4500.	900.	37108.	0.025	-90.19	41.2	61	93
58	7900.	1600.	70681.	0.025	-6208.78	44.2	61	62
59	4500.	750.	32424.	0.025	2044.19	43.2	61	30
60	7900.	1000.	29239.	0.025	-1696.09	29.2	30	31
61	4500.	700.	27462.	0.025	-2132.54	39.2	30	62
62	11700.	1200.	21880.	0.025	33.48	18.2	93	94
63	7900.	1200.	25481.	0.025	807.35	21.2	62	94
64	7900.	1400.	53529.	0.025	-7187.16	38.2	62	63
65	4500.	600.	22936.	0.025	1961.40	38.2	62	31
66	4500.	500.	17615.	0.025	-2351.18	35.2	31	63
67	7900.	900.	19118.	0.025	-1306.27	21.2	31	32
68	4500.	400.	14894.	0.025	2662.86	37.2	63	32
69	7900.	1100.	38777.	0.025	-6875.38	35.3	63	64
70	8500.	1050.	11812.	0.025	-210.02	11.2	94	64
71	7900.	1600.	14791.	0.025	630.95	9.2	94	95
72	4500.	400.	13299.	0.025	-1864.76	33.2	32	64
73	8200.	900.	25434.	0.025	-2104.26	28.3	32	33
74	4500.	400.	15299.	0.025	740.33	38.2	64	33
75	8400.	1350.	51667.	0.030	-7789.66	38.3	64	65
76	4500.	900.	5631.	0.030	413.57	6.3	95	96
77	4500.	800.	20216.	0.030	-139.36	25.3	96	65
78	10500.	500.	3134.	0.030	217.47	6.3	95	97
79	7900.	1050.	11847.	0.030	274.22	11.3	96	97
80	4500.	700.	26097.	0.030	-4264.90	37.3	65	97
81	7900.	800.	27416.	0.030	-2910.63	34.3	33	65
82	7000.	1800.	34675.	0.030	66.18	19.3	33	34
83	7900.	1400.	14380.	0.030	66.29	10.3	34	35
84	7900.	1200.	44734.	0.030	-6295.84	37.3	65	66
85	4500.	700.	27496.	0.030	2309.39	39.3	97	66
86	7900.	1300.	27677.	0.030	-1463.57	21.3	97	98
87	4500.	800.	34628.	0.030	-4505.23	43.3	66	98
88	7900.	1100.	34424.	0.030	-4099.83	31.3	66	67
89	7900.	1200.	11145.	0.030	66.34	9.3	35	36
90	4500.	500.	21645.	0.030	3652.21	43.3	98	67
91	7000.	700.	21908.	0.030	-2316.44	31.3	98	99
92	3000.	500.	21647.	0.030	-1867.47	43.3	67	99
93	3000.	600.	19976.	0.030	1943.53	33.3	67	36
94	5300.	1100.	19035.	0.030	-847.96	17.3	36	37
95	3000.	500.	17646.	0.030	-1029.09	35.3	36	68
96	5300.	800.	34639.	0.030	-3940.99	43.3	67	68
97	3000.	600.	25976.	0.030	2920.24	43.3	99	68
98	5300.	800.	16237.	0.030	-1263.52	20.3	99	100
99	5300.	1100.	47631.	0.030	-5481.75	43.3	68	69
100	3000.	500.	18648.	0.030	2408.41	37.3	68	37
101	5300.	1050.	32876.	0.025	-2224.40	31.3	37	38
102	3000.	600.	25980.	0.025	-1031.90	43.3	37	69
103	3000.	600.	23582.	0.025	951.65	39.3	100	69
104	10700.	1400.	18640.	0.025	-311.76	13.3	100	101
105	5300.	1100.	43235.	0.025	-4472.45	39.3	69	70
106	3000.	600.	25982.	0.025	2992.70	43.3	69	38
107	5300.	1050.	34971.	0.025	-2798.84	33.3	38	39
108	3000.	700.	29612.	0.025	-2418.19	42.3	38	70

48	0.0	0.37	164	165	166	167	0
49	0.0	0.37	166	171	172	173	0
50	0.0	0.38	172	179	180	181	0
51	0.0	0.38	180	184	185	188	0
52	0.0	0.39	188	192	193	0	0
53	0.0	0.40	193	194	199	0	0
54	0.0	0.40	199	200	204	205	0
55	0.0	0.42	205	206	209	210	0
56	0.0	0.43	210	211	216	217	0
57	0.0	0.43	217	218	221	0	0
58	0.0	0.22	37	40	36	34	39
59	0.0	0.23	44	40	43	47	46
60	0.0	0.25	47	48	50	51	52
61	0.0	0.25	51	55	57	58	59
62	0.0	0.25	58	61	63	64	65
63	0.0	0.26	64	66	68	69	0
64	0.0	0.28	69	70	72	74	75
65	0.0	0.30	75	77	80	81	84
66	0.0	0.31	84	85	87	88	0
67	0.0	0.32	88	90	92	93	96
68	0.0	0.32	95	96	97	99	100
69	0.0	0.33	99	102	103	105	106
70	0.0	0.33	105	108	109	110	111
71	0.0	0.33	110	113	114	116	117
72	0.0	0.34	116	119	120	122	123
73	0.0	0.34	122	125	126	127	128
74	0.0	0.35	127	130	131	132	133
75	0.0	0.35	132	136	137	139	140
76	0.0	0.36	140	142	144	146	147
77	0.0	0.36	147	149	150	152	153
78	0.0	0.36	153	155	156	158	159
79	0.0	0.37	160	161	163	164	159
80	0.0	0.37	163	167	168	170	171
81	0.0	0.38	170	173	177	178	179
82	0.0	0.38	178	181	183	184	0
83	0.0	0.38	183	185	186	189	190
84	0.0	0.39	189	192	194	195	196
85	0.0	0.40	195	198	200	201	0
86	0.0	0.41	201	203	204	206	207
87	0.0	0.42	207	209	211	212	213
88	0.0	0.43	212	215	216	218	219
89	0.0	0.22	41	33	37	0	0
90	0.0	0.23	41	43	42	0	0
91	0.0	0.24	42	49	48	0	0
92	0.0	0.25	49	50	56	0	0
93	0.0	0.25	56	57	62	0	0
94	0.0	0.25	62	63	70	71	0
95	0.0	0.26	71	76	78	0	0
96	0.0	0.30	76	77	79	0	0
97	0.0	0.31	78	79	80	85	86
98	0.0	0.31	86	87	90	91	0
99	0.0	0.32	91	92	98	97	0
100	0.0	0.33	98	103	104	0	0
101	0.0	0.33	104	109	114	115	0
102	0.0	0.34	115	120	121	0	0
103	0.0	0.34	121	126	134	0	0
104	0.0	0.35	133	134	135	136	0
105	0.0	0.36	135	141	142	143	0
106	0.0	0.36	141	148	149	0	0
107	0.0	0.36	148	154	0	0	0
108	0.0	0.36	154	155	160	162	0

109	3000.	850.	18108.	0.025	-169.84	21.3	70	101
110	5300.	1500.	49970.	0.025	-3475.90	33.3	70	71
111	3000.	800.	33045.	0.025	3244.78	41.3	70	39
112	6000.	1400.	43833.	0.025	-2316.21	31.3	39	40
113	3000.	800.	29844.	0.025	-1627.27	37.3	39	71
114	3200.	900.	6582.	0.025	-8.80	7.3	101	71
115	4700.	1000.	10313.	0.025	-490.11	10.3	101	102
116	5300.	1200.	32774.	0.025	-2114.41	27.3	71	72
117	3100.	800.	33044.	0.025	2979.80	41.3	71	40
118	5300.	1300.	40710.	0.025	-2231.89	31.3	40	41
119	3000.	800.	33051.	0.025	-3064.01	41.3	40	72
120	2600.	500.	11654.	0.025	186.01	23.3	102	72
121	10500.	600.	11584.	0.025	-304.10	19.3	102	103
122	5300.	1200.	44779.	0.025	-5160.97	37.3	72	73
123	3000.	700.	23317.	0.025	203.35	33.3	72	41
124	5300.	1200.	18382.	0.025	-1006.61	15.3	41	42
125	3000.	700.	16322.	0.025	-1428.54	23.3	41	73
126	3000.	600.	24188.	0.025	-633.87	40.3	73	103
127	5500.	1200.	35189.	0.025	-5283.30	29.3	73	74
128	2800.	700.	11418.	0.025	672.37	16.3	73	42
129	4200.	900.	11993.	0.025	-677.17	13.3	42	43
130	3000.	700.	13526.	0.025	-1001.75	19.3	42	74
131	3000.	350.	14109.	0.025	1653.78	40.3	74	43
132	5300.	700.	28226.	0.025	-2912.44	40.3	74	75
133	3000.	400.	14928.	0.025	-1718.85	37.3	74	104
134	6100.	1000.	15326.	0.025	-937.72	15.3	103	104
135	5300.	600.	16993.	0.025	-1793.99	28.3	104	105
136	3000.	400.	16128.	0.025	862.62	40.3	104	75
137	3000.	300.	12393.	0.025	-680.21	41.3	43	75
138	5300.	600.	21194.	0.025	-1650.75	35.3	43	44
139	3000.	400.	16527.	0.025	1659.32	41.3	75	44
140	5300.	600.	24198.	0.025	-2795.68	40.3	75	76
141	5300.	750.	20494.	0.025	-1500.36	27.3	105	106
142	3000.	300.	12995.	0.025	293.55	43.3	105	76
143	9000.	170.	2692.	0.025	-0.03	15.8	105	156
144	3000.	450.	19047.	0.025	-2077.80	42.3	44	76
145	5300.	500.	14164.	0.025	-1232.23	28.3	44	45
146	3000.	400.	16927.	0.025	1938.08	42.3	76	45
147	5300.	650.	26214.	0.025	-3228.95	40.3	76	77
148	5300.	500.	11662.	0.025	-957.63	23.3	106	107
149	3000.	450.	16794.	0.025	542.82	37.3	106	77
150	3000.	300.	12394.	0.025	-1361.35	41.3	45	77
151	5300.	700.	19832.	0.025	-1808.96	28.3	45	46
152	3000.	300.	12394.	0.025	1508.08	41.3	77	46
153	5300.	750.	28000.	0.025	-3624.88	37.3	77	78
154	5000.	750.	20500.	0.025	-957.62	27.3	107	108
155	3000.	400.	16529.	0.025	-1156.50	41.3	78	108
156	3000.	400.	16529.	0.025	-2134.01	41.3	46	78
157	5300.	500.	12665.	0.025	-1182.97	25.3	46	47
158	3000.	300.	12396.	0.025	1672.93	41.3	78	47
159	5300.	500.	20168.	0.025	-2929.56	40.3	78	79
160	3000.	250.	7829.	0.025	1054.23	31.3	108	79
161	3000.	300.	12399.	0.025	-1573.54	41.3	47	79
162	5000.	600.	9204.	0.025	-1059.88	15.3	108	109
163	5500.	700.	24040.	0.025	-3226.96	34.3	79	80
164	3000.	350.	14867.	0.025	2330.17	41.3	79	48
165	6000.	450.	12750.	0.025	-1282.36	28.3	47	48
166	5300.	600.	18804.	0.025	-2068.22	31.3	48	49
167	3000.	300.	12098.	0.025	-1544.32	40.3	48	80
168	2700.	450.	7801.	0.025	512.69	17.3	109	80
169	5300.	550.	6239.	0.025	-205.23	11.3	109	111

109	0.0	0.37	162	168	169	175	0
110	0.0	0.37	175	176	249	0	0
111	0.0	0.38	169	174	0	0	0
112	0.0	0.38	174	177	182	0	0
113	0.0	0.38	176	182	186	187	0
114	0.0	0.38	187	190	191	250	0
115	0.0	0.39	191	196	197	198	0
116	0.0	0.41	197	202	203	0	0
117	0.0	0.42	202	208	0	0	0
118	0.0	0.42	208	213	214	215	0
119	0.0	0.44	214	220	0	0	0
120	0.0	0.44	219	220	221	222	251
121	0.0	0.45	222	223	0	0	0
122	0.0	0.47	223	224	0	0	0
123	0.0	0.48	224	225	0	0	0
124	0.0	0.49	225	226	252	0	0
125	0.0	0.52	227	226	0	0	0
126	0.0	0.53	227	228	230	0	0
127	0.0	0.55	229	228	0	0	0
128	0.0	0.56	230	231	0	0	0
129	0.0	0.57	229	231	232	0	0
130	0.0	0.59	232	233	0	0	0
131	0.0	0.62	233	234	0	0	0
132	0.0	0.63	234	235	0	0	0
133	0.0	0.66	235	236	238	0	0
134	0.0	0.68	236	237	0	0	0
135	0.0	0.69	238	239	0	0	0
136	0.0	0.70	237	239	240	0	0
137	0.0	0.76	240	241	253	0	0
138	0.0	0.79	241	242	0	0	0
139	0.0	0.85	242	243	0	0	0
140	0.0	0.89	243	244	0	0	0
141	-7900.0	0.98	244	0	0	0	0
142	0.0	0.20	28	29	32	0	0
143	0.0	0.20	29	30	0	0	0
144	0.0	0.19	30	31	0	0	0
145	0.0	0.19	31	0	0	0	0
146	0.0	0.20	32	0	0	0	0
147	0.0	0.26	245	0	0	0	0
148	0.0	0.34	246	247	0	0	0
149	0.0	0.34	247	248	0	0	0
150	-2100.0	0.35	248	0	0	0	0
151	0.0	0.36	249	0	0	0	0
152	0.0	0.39	250	0	0	0	0
153	0.0	0.43	251	0	0	0	0
154	0.0	0.49	252	0	0	0	0
155	0.0	0.76	253	0	0	0	0
156	0.0	0.36	143	0	0	0	0

170	5300.	700.	24742.	0.025	-3608.01	35.3	80	81
171	3000.	350.	14116.	0.025	1675.98	40.3	80	49
172	5300.	600.	15204.	0.025	-1669.15	25.3	49	50
173	3000.	300.	12101.	0.025	-2075.00	40.3	49	81
174	5300.	450.	8252.	0.025	-205.23	18.3	111	112
175	6000.	700.	7942.	0.025	-341.96	11.3	109	110
176	10500.	700.	7943.	0.025	-341.90	11.3	110	113
177	3000.	350.	13768.	0.025	-897.19	39.3	81	112
178	5300.	600.	21810.	0.025	-2940.59	36.3	81	82
179	3000.	350.	14118.	0.025	1845.43	40.3	81	50
180	5300.	450.	15905.	0.025	-1648.59	35.3	50	51
181	3000.	400.	14938.	0.025	-1866.04	37.3	50	82
182	5300.	700.	12842.	0.025	-1102.40	16.3	112	113
183	5700.	600.	26013.	0.025	-4013.95	43.4	82	83
184	3000.	400.	15337.	0.025	792.69	38.3	82	51
185	2700.	300.	8801.	0.025	-1290.10	29.3	51	83
186	3000.	300.	12101.	0.025	1132.92	40.3	113	83
187	5700.	600.	11612.	0.025	-311.48	19.4	113	114
188	5100.	600.	9210.	0.025	-1151.24	15.4	51	52
189	5400.	650.	25579.	0.025	-6152.29	39.4	83	84
190	3000.	300.	10001.	0.025	-284.34	33.3	83	114
191	5300.	800.	9086.	0.040	-595.97	11.4	114	115
192	2800.	400.	14944.	0.040	-442.06	37.4	52	84
193	5300.	700.	14257.	0.040	-709.24	20.4	52	53
194	2800.	300.	12406.	0.040	1566.07	41.4	84	53
195	5400.	750.	29527.	0.040	-4982.75	39.4	84	85
196	2800.	400.	5341.	0.040	-45.71	13.4	84	115
197	5000.	500.	4684.	0.040	-352.24	9.4	115	116
198	2800.	400.	4544.	0.040	289.43	11.4	115	85
199	5600.	600.	18818.	0.040	-2275.19	31.4	53	54
200	2800.	400.	12545.	0.040	721.15	31.4	85	54
201	5300.	600.	23626.	0.040	-4551.23	39.4	85	86
202	5300.	800.	17107.	0.040	-774.69	21.4	116	117
203	2800.	300.	9711.	0.040	-422.37	32.4	116	86
204	2800.	300.	6709.	0.040	-1009.09	22.4	54	86
205	5300.	900.	17447.	0.040	-1987.28	19.4	54	55
206	2800.	350.	8181.	0.040	897.66	23.4	86	55
207	5300.	800.	26706.	0.040	-4240.40	33.4	86	87
208	5600.	900.	13849.	0.040	-774.73	15.4	117	118
209	2800.	400.	11754.	0.040	-1643.58	29.4	55	87
210	5000.	600.	11634.	0.040	-1241.49	19.4	55	56
211	2800.	350.	8184.	0.040	959.36	23.4	87	56
212	5300.	800.	26714.	0.040	-3875.28	33.4	87	88
213	2800.	400.	11754.	0.040	-1049.54	29.4	87	118
214	5300.	800.	9122.	0.040	-642.85	11.4	118	119
215	2800.	300.	8215.	0.040	1181.46	27.4	118	88
216	2800.	400.	10156.	0.040	-940.50	25.4	56	88
217	5300.	700.	13577.	0.040	-1260.36	19.4	56	57
218	2800.	350.	12386.	0.040	2131.78	35.4	88	57
219	5300.	600.	21242.	0.040	-3865.39	35.4	88	120
220	2800.	700.	9387.	0.040	-642.86	13.4	119	120
221	2800.	600.	20044.	0.040	-3392.01	33.4	57	120
222	5300.	1350.	45111.	0.040	-7900.23	33.4	120	121
223	6800.	2600.	53135.	0.040	-7900.43	20.4	121	122
224	8300.	1500.	44163.	0.040	-7900.68	29.4	122	123
225	5200.	1900.	44578.	0.040	-7900.86	23.5	123	124
226	6800.	1500.	35222.	0.040	-7901.18	23.5	124	125
227	6800.	1100.	36844.	0.040	-7901.42	33.5	125	126
228	4800.	1100.	25860.	0.040	-7052.32	23.5	126	127
229	5600.	900.	25675.	0.040	-7052.53	28.5	127	129
230	5400.	400.	5000.	0.045	-849.38	12.5	126	128

231	6900.	450.	6985.	0.045	-849.48	15.5	128	129
232	6900.	1100.	30303.	0.045	-7902.52	27.5	129	130
233	6000.	1000.	27578.	0.045	-7902.98	27.6	130	131
234	5300.	900.	28442.	0.045	-7903.35	31.6	131	132
235	6000.	1200.	28354.	0.045	-7903.59	23.6	132	133
236	5300.	1000.	25652.	0.045	-7284.99	25.7	133	134
237	4800.	1100.	23845.	0.045	-7284.77	21.7	134	136
238	6000.	300.	2902.	0.045	-618.56	9.7	133	135
239	6000.	300.	4105.	0.045	-618.41	13.7	135	136
240	6800.	1000.	18728.	0.045	-7902.73	16.7	136	137
241	4800.	1200.	22533.	0.045	-7901.95	18.8	137	138
242	7300.	1200.	18982.	0.045	-7901.27	15.8	138	139
243	7600.	900.	16084.	0.045	-7900.43	17.9	139	140
244	6500.	900.	12542.	0.045	-7899.88	13.9	140	141
245	9000.	300.	2268.	0.020	-0.03	7.6	34	147
246	10660.	750.	9906.	0.020	-2099.94	13.2	39	148
247	10660.	6100.	105583.	0.020	-2099.90	17.3	148	149
248	10660.	550.	7655.	0.020	-2099.95	13.9	149	150
249	9000.	300.	1933.	0.020	0.01	6.4	110	151
250	9000.	300.	3256.	0.020	0.07	10.9	114	152
251	9000.	600.	7205.	0.035	2.80	12.0	120	153
252	6330.	330.	3781.	0.035	6.11	11.5	124	154
253	6000.	330.	2627.	0.040	8.06	8.0	137	155

SECTION 2.6 SPECIFY INITIAL WATER QUALITY CONDITIONS

WATER QUALITY DATA

JUNC.	INFLOW	FIRST CONSTITUENT INITIAL CONC.	FIRST CONSTITUENT INFLOW LOAD.	SECOND CONSTITUENT INITIAL CONC.	SECOND CONSTITUENT INFLOW LOAD.	THIRD CONSTITUENT INITIAL CONC.	THIRD CONSTITUENT INFLOW LOAD	FOURTH CONSTITUENT INITIAL CONC.	FOURTH CONSTITUENT INFLOW LOAD	FIFTH CONSTITUENT INITIAL CONC.	FIFTH CONSTITUENT INFLOW LOAD
1	0.0	0.40	0.0	0.10	0.0	1.50	0.0	1.00	0.0	5.00	0.0
2	0.0	0.40	0.0	0.10	0.0	1.50	0.0	1.00	0.0	5.00	0.0
3	0.0	0.40	0.0	0.10	0.0	1.50	0.0	1.00	0.0	5.00	0.0
4	0.0	0.40	0.0	0.10	0.0	1.50	0.0	1.00	0.0	5.00	0.0
5	0.0	0.40	0.0	0.10	0.0	1.50	0.0	1.00	0.0	5.00	0.0
6	0.0	0.40	0.0	0.10	0.0	1.50	0.0	1.00	0.0	5.00	0.0
7	0.0	0.40	0.0	0.10	0.0	1.50	0.0	1.00	0.0	5.00	0.0
8	0.0	0.40	0.0	0.10	0.0	1.50	0.0	1.00	0.0	5.00	0.0
9	0.0	0.40	0.0	0.10	0.0	1.50	0.0	1.00	0.0	5.00	0.0
10	0.0	0.40	0.0	0.10	0.0	1.50	0.0	1.00	0.0	5.00	0.0
11	0.0	0.40	0.0	0.10	0.0	1.50	0.0	1.00	0.0	5.00	0.0
12	0.0	0.40	0.0	0.10	0.0	1.50	0.0	1.00	0.0	5.00	0.0
13	0.0	0.40	0.0	0.10	0.0	1.50	0.0	1.00	0.0	5.00	0.0
14	-4.3	0.40	0.05	0.10	0.20	1.70	0.0	1.00	1.63	5.00	0.12
15	0.0	0.40	0.0	0.10	0.0	1.70	0.0	1.00	0.0	5.00	0.0
16	0.0	0.40	0.0	0.10	0.0	1.70	0.0	1.00	0.0	5.00	0.0
17	-3.7	0.40	0.0	0.10	0.0	1.70	0.0	1.00	0.16	5.00	0.0
18	0.0	0.40	0.0	0.10	0.0	1.70	0.0	1.00	0.0	5.00	0.0
19	0.0	0.40	0.0	0.10	0.0	1.70	0.0	1.00	0.0	5.00	0.0
20	0.0	0.40	0.0	0.10	0.0	1.70	0.0	1.00	0.0	5.00	0.0
21	-12.4	0.40	1.34	0.10	2.49	1.70	0.06	1.00	0.0	5.00	0.20
22	-0.9	0.40	0.01	0.10	0.09	1.70	0.0	1.00	0.0	5.00	0.0
23	-1.4	0.40	0.09	0.10	0.22	1.70	0.0	1.00	1.41	5.00	0.0
24	-162.3	0.50	4.38	0.10	10.56	1.70	29.63	1.00	0.0	5.00	3.48
25	-0.8	0.50	0.0	0.10	0.0	1.70	0.0	1.00	0.78	5.00	0.0
26	-121.7	0.50	4.19	0.10	7.67	1.70	1.48	1.00	13.65	5.00	2.69
27	0.0	0.50	0.0	0.10	0.0	1.70	0.0	1.00	0.0	5.00	0.0
28	0.0	0.50	0.0	0.10	0.0	1.40	0.0	1.00	0.0	5.00	0.0
29	-54.9	0.50	0.34	0.10	0.54	1.40	0.59	1.00	0.0	5.00	0.41
30	-296.5	0.50	2.68	0.10	2.24	1.40	4.14	2.00	1.00	5.00	5.17
31	-13.6	0.50	0.35	0.30	1.15	1.40	0.08	2.00	15.23	5.00	0.07
32	-68.1	0.50	1.43	0.30	0.09	1.40	1.69	2.00	0.84	5.00	2.78
33	0.0	0.50	0.0	0.30	0.0	1.40	0.0	2.00	0.0	3.00	0.0
34	-4.0	0.50	0.04	0.30	0.30	1.40	0.08	2.00	0.0	3.00	0.05
35	0.0	0.50	0.0	0.30	0.0	1.40	0.0	2.00	0.0	3.00	0.0
36	0.0	0.50	0.0	0.65	0.0	1.40	0.0	2.00	0.0	3.00	0.0
37	0.0	0.50	0.0	0.65	0.0	1.40	0.0	2.00	0.0	3.00	0.0
38	-217.0	0.50	5.84	0.65	7.24	1.20	0.71	3.00	74.55	3.00	4.67
39	0.0	0.50	0.0	0.65	0.0	1.20	0.0	3.00	0.0	1.50	0.0
40	0.0	0.50	0.0	0.65	0.0	1.20	0.0	3.00	0.0	1.50	0.0
41	0.0	0.50	0.0	0.65	0.0	1.20	0.0	3.00	0.0	1.50	0.0
42	0.0	0.50	0.0	0.65	0.0	1.20	0.0	3.00	0.0	1.50	0.0
43	0.0	0.50	0.0	0.65	0.0	1.20	0.0	3.00	0.0	1.50	0.0

44	-203.0	0.50	6.56	0.65	2.30	1.20	1.53	3.00	141.11	1.50	4.37
45	0.0	0.50	0.0	0.65	0.0	1.20	0.0	3.00	0.0	1.50	0.0
46	-39.5	0.50	0.26	0.65	0.09	1.20	0.34	3.00	0.0	1.50	0.75
47	0.0	0.50	0.0	0.65	0.0	1.20	0.0	3.00	0.0	1.50	0.0
48	-24.5	0.50	0.26	0.65	0.04	1.20	0.09	1.50	0.0	1.50	0.26
49	0.0	0.50	0.0	0.65	0.0	1.20	0.0	1.50	0.0	1.50	0.0
50	0.0	0.50	0.0	0.40	0.0	1.20	0.0	1.50	0.0	3.00	0.0
51	-266.6	0.50	11.49	0.40	14.21	1.20	0.72	1.50	135.31	3.00	3.73
52	0.0	0.50	0.0	0.40	0.0	1.20	0.0	1.50	0.0	3.00	0.0
53	0.0	0.50	0.0	0.40	0.0	1.20	0.0	1.00	0.0	3.00	0.0
54	0.0	0.50	0.0	0.40	0.0	1.20	0.0	1.00	0.0	3.00	0.0
55	0.0	0.50	0.0	0.40	0.0	1.20	0.0	1.00	0.0	5.50	0.0
56	-5.0	0.40	0.03	0.20	0.00	1.20	0.09	1.00	0.04	5.50	0.28
57	0.0	0.40	0.0	0.20	0.0	1.20	0.0	1.00	0.0	5.50	0.0
58	0.0	0.50	0.0	0.10	0.0	1.70	0.0	1.00	0.0	5.00	0.0
59	0.0	0.50	0.0	0.10	0.0	1.70	0.0	1.00	0.0	5.00	0.0
60	0.0	0.50	0.0	0.10	0.0	1.40	0.0	1.00	0.0	5.00	0.0
61	0.0	0.50	0.0	0.10	0.0	1.40	0.0	2.00	0.0	5.00	0.0
62	0.0	0.50	0.0	0.30	0.0	1.40	0.0	2.00	0.0	5.00	0.0
63	0.0	0.50	0.0	0.30	0.0	1.40	0.0	2.00	0.0	5.00	0.0
64	0.0	0.50	0.0	0.30	0.0	1.40	0.0	2.00	0.0	3.00	0.0
65	0.0	0.50	0.0	0.30	0.0	1.40	0.0	2.00	0.0	3.00	0.0
66	0.0	0.50	0.0	0.30	0.0	1.40	0.0	2.00	0.0	3.00	0.0
67	0.0	0.50	0.0	0.30	0.0	1.40	0.0	2.00	0.0	3.00	0.0
68	0.0	0.50	0.0	0.65	0.0	1.40	0.0	2.00	0.0	3.00	0.0
69	0.0	0.50	0.0	0.65	0.0	1.40	0.0	2.00	0.0	3.00	0.0
70	0.0	0.50	0.0	0.65	0.0	1.20	0.0	3.00	0.0	1.50	0.0
71	0.0	0.50	0.0	0.65	0.0	1.20	0.0	3.00	0.0	1.50	0.0
72	0.0	0.50	0.0	0.65	0.0	1.20	0.0	3.00	0.0	1.50	0.0
73	0.0	0.50	0.0	0.65	0.0	1.20	0.0	3.00	0.0	1.50	0.0
74	0.0	0.50	0.0	0.65	0.0	1.20	0.0	3.00	0.0	1.50	0.0
75	0.0	0.50	0.0	0.65	0.0	1.20	0.0	3.00	0.0	1.50	0.0
76	0.0	0.50	0.0	0.65	0.0	1.20	0.0	3.00	0.0	1.50	0.0
77	0.0	0.50	0.0	0.65	0.0	1.20	0.0	3.00	0.0	1.50	0.0
78	0.0	0.50	0.0	0.65	0.0	1.20	0.0	3.00	0.0	1.50	0.0
79	0.0	0.50	0.0	0.65	0.0	1.20	0.0	3.00	0.0	1.50	0.0
80	0.0	0.50	0.0	0.65	0.0	1.20	0.0	1.50	0.0	1.50	0.0
81	0.0	0.50	0.0	0.65	0.0	1.20	0.0	1.50	0.0	3.00	0.0
82	0.0	0.50	0.0	0.40	0.0	1.20	0.0	1.50	0.0	3.00	0.0
83	0.0	0.50	0.0	0.40	0.0	1.20	0.0	1.50	0.0	3.00	0.0
84	0.0	0.50	0.0	0.40	0.0	1.20	0.0	1.50	0.0	3.00	0.0
85	0.0	0.50	0.0	0.40	0.0	1.20	0.0	1.00	0.0	3.00	0.0
86	0.0	0.50	0.0	0.40	0.0	1.20	0.0	1.00	0.0	3.00	0.0
87	0.0	0.40	0.0	0.20	0.0	1.20	0.0	1.00	0.0	5.50	0.0
88	0.0	0.40	0.0	0.20	0.0	1.20	0.0	1.00	0.0	5.50	0.0
89	-0.5	0.50	0.0	0.10	0.0	1.70	0.0	1.00	0.09	5.00	0.0
90	0.0	0.50	0.0	0.10	0.0	1.70	0.0	1.00	0.0	5.00	0.0
91	-48.3	0.50	0.26	0.10	0.04	1.40	0.32	1.00	1.28	5.00	1.30
92	0.0	0.50	0.0	0.10	0.0	1.40	0.0	1.00	0.0	5.00	0.0
93	-2.8	0.50	0.38	0.10	0.66	1.40	0.0	2.00	0.0	5.00	0.02
94	0.0	0.50	0.0	0.30	0.0	1.40	0.0	2.00	0.0	5.00	0.0
95	0.0	0.50	0.0	0.30	0.0	1.40	0.0	2.00	0.0	5.00	0.0
96	0.0	0.50	0.0	0.30	0.0	1.40	0.0	2.00	0.0	3.00	0.0
97	-23.2	0.50	0.25	0.30	0.63	1.40	2.75	2.00	0.0	3.00	0.75
98	-0.9	0.50	0.0	0.30	0.0	1.40	0.0	2.00	0.0	3.00	0.0
99	-34.6	0.50	0.27	0.65	1.14	1.40	1.06	2.00	0.0	3.00	0.70
100	-60.6	0.50	0.53	0.65	1.49	1.40	0.59	2.00	2.65	3.00	0.48
101	-3.9	0.50	0.0	0.65	0.04	1.20	0.0	3.00	2.43	1.50	0.0
102	0.0	0.50	0.0	0.65	0.0	1.20	0.0	3.00	0.0	1.50	0.0
103	-6.8	0.50	0.06	0.65	0.0	1.20	0.17	3.00	0.0	1.50	0.18
104	-98.8	0.50	1.02	0.65	0.68	1.20	0.64	3.00	4.69	1.50	2.18

105	0.0	0.50	0.0	0.65	0.0	1.20	0.0	3.00	0.0	1.50	0.0
106	-42.3	0.50	3.47	0.65	2.17	1.20	0.0	3.00	47.20	1.50	0.22
107	0.0	0.50	0.0	0.65	0.0	1.20	0.0	3.00	0.0	1.50	0.0
108	0.0	0.50	0.0	0.65	0.0	1.20	0.0	3.00	0.0	1.50	0.0
109	0.0	0.50	0.0	0.65	0.0	1.20	0.0	1.50	0.0	1.50	0.0
110	0.0	0.50	0.0	0.65	0.0	1.20	0.0	1.50	0.0	1.50	0.0
111	0.0	0.50	0.0	0.65	0.0	1.20	0.0	1.50	0.0	1.50	0.0
112	0.0	0.50	0.0	0.40	0.0	1.20	0.0	1.50	0.0	1.00	0.0
113	-7.7	0.50	0.29	0.40	0.60	1.20	0.00	1.50	8.21	3.00	0.01
114	0.0	0.50	0.0	0.40	0.0	1.20	0.0	1.50	0.0	1.00	0.0
115	0.0	0.50	0.0	0.40	0.0	1.20	0.0	1.00	0.0	1.00	0.0
116	-0.6	0.50	0.02	0.40	0.11	1.20	0.01	1.00	0.21	1.00	0.01
117	0.0	0.50	0.0	0.40	0.0	1.20	0.0	1.00	0.0	1.00	0.0
118	-3.1	0.40	0.13	0.20	0.27	1.20	0.0	1.00	0.71	5.50	0.05
119	0.0	0.40	0.0	0.20	0.0	1.20	0.0	1.00	0.0	5.50	0.0
120	0.0	0.40	0.0	0.20	0.0	1.20	0.0	1.00	0.0	5.50	0.0
121	0.0	0.40	0.0	0.20	0.0	1.20	0.0	1.00	0.0	5.50	0.0
122	0.0	0.40	0.0	0.20	0.0	1.20	0.0	1.00	0.0	5.50	0.0
123	0.0	0.40	0.0	0.20	0.0	1.20	0.0	1.00	0.0	5.50	0.0
124	0.0	0.40	0.0	0.20	0.0	1.20	0.0	1.00	0.0	5.50	0.0
125	-3.9	0.40	0.16	0.20	0.24	1.20	0.03	1.00	2.72	5.50	0.04
126	-2.6	0.40	0.17	0.20	0.21	1.20	0.01	2.00	0.41	5.50	0.03
127	-9.2	0.40	0.12	0.20	0.11	1.20	0.04	2.00	1.61	5.50	0.14
128	-5.0	0.40	0.0	0.20	0.0	1.20	0.0	2.00	0.48	5.50	0.0
129	0.0	0.40	0.0	0.20	0.0	1.20	0.0	2.00	0.0	5.50	0.0
130	0.0	0.40	0.0	0.20	0.0	1.20	0.0	2.00	0.0	5.50	0.0
131	-26.6	0.40	0.94	0.20	1.38	1.20	0.03	2.00	2.92	5.50	0.26
132	0.0	0.40	0.0	0.20	0.0	1.20	0.0	2.00	0.0	7.50	0.0
133	0.0	0.40	0.0	0.20	0.0	1.20	0.0	2.00	0.0	7.50	0.0
134	-105.9	0.40	0.57	0.20	1.34	1.20	0.84	2.00	1.48	7.50	2.91
135	0.0	0.40	0.0	0.20	0.0	1.20	0.0	2.00	0.0	7.50	0.0
136	0.0	0.40	0.0	0.20	0.0	1.20	0.0	2.00	0.0	7.50	0.0
137	-1.5	0.40	0.03	0.20	0.12	1.20	0.0	2.00	0.58	7.50	0.04
138	0.0	0.40	0.0	0.20	0.0	1.20	0.0	2.00	0.0	7.50	0.0
139	0.0	0.40	0.0	0.20	0.0	1.20	0.0	2.00	0.0	7.50	0.0
140	-29.4	0.40	0.95	0.20	7.14	1.20	0.0	2.00	20.70	7.50	0.16
141	-7807.7	0.40	12.08	0.20	4.24	1.20	30.40	2.00	159.52	7.50	389.80
142	0.0	0.40	0.0	0.20	0.0	1.20	0.0	2.00	0.0	7.50	0.0
143	0.0	0.40	0.0	0.20	0.0	1.20	0.0	2.00	0.0	7.50	0.0
144	0.0	0.40	0.0	0.20	0.0	1.20	0.0	2.00	0.0	7.50	0.0
145	-230.0	0.40	1.24	0.20	0.28	1.20	1.88	2.00	8.08	7.50	4.95
146	-472.7	0.40	2.14	0.20	0.15	1.20	5.32	2.00	35.43	7.50	20.87
147	-65.4	0.40	0.65	0.20	4.03	1.20	0.80	2.00	11.16	7.50	1.04
148	-20.0	0.40	0.29	0.20	0.16	1.20	1.05	2.00	0.0	7.50	0.53
149	-3.4	0.40	0.04	0.20	0.01	1.20	0.01	2.00	0.0	7.50	0.03
150	-1350.0	0.40	1.09	0.20	0.29	1.20	16.36	2.00	27.41	7.50	58.16
151	-49.0	0.40	0.75	0.20	1.38	1.20	0.31	2.00	6.24	7.50	1.04
152	-18.0	0.40	0.15	0.20	0.19	1.20	0.16	2.00	0.90	7.50	0.29
153	-242.9	0.40	1.57	0.20	0.26	1.20	1.81	2.00	7.44	7.50	9.05
154	-159.4	0.40	1.18	0.20	0.15	1.20	2.75	2.00	2.36	7.50	6.95
155	-76.3	0.40	0.63	0.20	1.84	1.20	0.64	2.00	3.35	7.50	2.66
156	-6.0	0.40	0.14	0.20	0.03	1.20	0.04	2.00	0.08	7.50	0.09

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                    SECTION 3.0  SIMULATE WATER QUALITY CONDITIONS (MAIN QUALITY LOOP)
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RESTART DECK TAPE WAS LAST WRITTEN AFTER CYCLE  850
HYDRAULIC CYCLE ON EXTRACT TAPE FOR RESTARTING =   560
NTAG =   4



RESTART DECK TAPE WAS LAST WRITTEN AFTER CYCLE 1050
HYDRAULIC CYCLE ON EXTRACT TAPE FOR RESTARTING =   560
NTAG =   4
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LOW SLACK PREDICTIONS

JUNCTION NUMBER	HEAD (FT)	CONCENTRATION FACTORS 1ST. CONSTIT. (MGL)	2ND. CONSTIT. (MGL)	3RD. CONSTIT. (MGL)	4TH. CONSTIT. (MGL)	5TH. CONSTIT. (MGL)
		CYCLE 1064	22 DAYS, 4.00 HOURS			
11	-1.2192	0.30	0.09	1.51	0.06	5.82
		CYCLE 1065	22 DAYS, 4.50 HOURS			
20	-1.3777	0.39	0.12	1.79	0.17	5.15
		CYCLE 1066	22 DAYS, 5.00 HOURS			
22	-0.9386	0.41	0.13	1.85	0.20	4.90
23	-1.2377	0.43	0.13	1.88	0.24	4.61
24	-1.5188	0.43	0.13	1.89	0.27	4.29
25	-1.8053	0.43	0.11	1.85	0.28	3.95
		CYCLE 1067	22 DAYS, 5.50 HOURS			
26	-1.0253	0.43	0.11	1.84	0.30	3.45
28	-1.4369	0.42	0.10	1.83	0.38	2.98
29	-1.7065	0.42	0.12	1.81	0.52	2.43
30	-1.8949	0.42	0.16	1.78	0.71	2.04
58	-1.1356	0.42	0.09	1.83	0.27	3.63
59	-1.3513	0.42	0.10	1.82	0.39	2.89
60	-1.6776	0.41	0.12	1.80	0.52	2.42
61	-1.8511	0.41	0.15	1.76	0.69	1.98
62	-1.9725	0.40	0.20	1.71	0.84	1.79
89	-1.1430	0.42	0.10	1.83	0.23	4.29
91	-1.6110	0.42	0.09	1.82	0.33	3.67
64	-2.2459	0.39	0.27	1.60	1.17	1.57
93	-1.8828	0.41	0.10	1.79	0.40	2.92
		CYCLE 1068	22 DAYS, 6.00 HOURS			
31	-1.0008	0.40	0.20	1.72	0.90	1.83
32	-1.2236	0.40	0.24	1.68	0.98	1.76

33	-1.4072	0.39	0.27	1.63	1.11	1.66
36	-2.0356	0.40	0.40	1.33	2.02	1.24
37	-2.1431	0.42	0.43	1.32	2.28	1.37
38	-2.2228	0.44	0.47	1.29	2.65	1.59
63	-1.1007	0.39	0.23	1.65	0.99	1.65
64	-1.3335	0.39	0.27	1.60	1.16	1.56
65	-1.5711	0.39	0.30	1.54	1.32	1.44
66	-1.7733	0.39	0.36	1.43	1.56	1.34
67	-1.9756	0.40	0.40	1.34	1.95	1.19
67	-1.9756	0.40	0.40	1.34	1.95	1.19
69	-2.1723	0.43	0.45	1.30	2.41	1.49
96	-1.5915	0.39	0.18	1.69	0.82	2.13
98	-1.8576	0.38	0.35	1.43	1.52	1.37
99	-2.0251	0.40	0.40	1.36	1.88	1.31
100	-2.1613	0.40	0.39	1.44	1.61	1.67
		CYCLE 1069	22 DAYS, 6.50 HOURS			
39	-1.4065	0.42	0.45	1.23	2.35	1.75
40	-1.4829	0.41	0.46	1.15	2.25	1.81
41	-1.5556	0.39	0.44	1.07	2.13	1.90
42	-1.6881	0.41	0.47	1.11	2.24	2.27
43	-1.8206	0.42	0.48	1.13	2.43	2.38
44	-1.9186	0.44	0.48	1.10	2.75	2.70
45	-2.0415	0.38	0.45	1.04	1.69	2.74
46	-2.1564	0.38	0.43	1.01	1.71	2.98
47	-2.2720	0.38	0.41	1.01	1.75	3.45
70	-1.3640	0.43	0.45	1.27	2.38	1.63
71	-1.4366	0.44	0.48	1.22	2.38	1.75
72	-2.3243	0.40	0.39	1.09	1.76	3.99
73	-1.6310	0.41	0.48	1.12	2.17	2.30
74	-1.7606	0.42	0.48	1.13	2.18	2.52
75	-1.8592	0.40	0.47	1.09	1.96	2.79

76	-1.9787	0.38	0.45	1.05	1.62	3.04
77	-2.0961	0.39	0.44	1.03	1.74	3.40
78	-2.2153	0.39	0.43	1.05	1.77	3.72
101	-1.3701	0.39	0.39	1.36	1.71	1.84
102	-1.5309	0.40	0.41	1.27	1.81	1.80
103	-1.6593	0.42	0.46	1.17	2.10	1.98
104	-1.8233	0.44	0.50	1.14	2.25	2.56
105	-1.9742	0.45	0.52	1.16	2.36	2.75
106	-2.0786	0.45	0.52	1.14	2.43	3.17
107	-2.2044	0.41	0.50	1.17	1.71	3.68
108	-2.2624	0.40	0.46	1.09	1.70	3.92
		CYCLE 1070	22 DAYS, 7.00 HOURS			
48	-1.4665	0.40	0.42	1.08	1.80	3.82
49	-1.5836	0.39	0.38	1.08	1.73	4.07
50	-1.7144	0.39	0.36	1.06	1.82	4.18
52	-2.0481	0.29	0.17	1.02	0.71	4.50
54	-2.2431	0.31	0.14	1.06	0.82	5.05
56	-2.4642	0.31	0.15	1.04	0.98	5.04
57	-2.5313	0.32	0.16	1.03	1.09	5.01
79	-1.3876	0.40	0.40	1.08	1.75	3.97
80	-1.5299	0.37	0.33	1.07	1.52	4.25
81	-1.6606	0.34	0.26	1.05	1.25	4.51
82	-1.7724	0.31	0.17	1.06	0.84	4.99
92	0.9132	0.41	0.09	1.80	0.36	3.31
84	-2.0718	0.31	0.15	1.06	0.85	5.03
85	-2.1998	0.31	0.14	1.06	0.84	5.06
86	-2.3269	0.31	0.15	1.05	0.92	5.03
87	-2.4237	0.31	0.15	1.04	1.00	4.96
88	-2.4943	0.32	0.16	1.03	1.09	4.92
109	-1.5309	0.36	0.44	1.03	1.40	4.13
111	-1.6528	0.32	0.34	0.99	1.16	3.81

112	-1.7038	0.31	0.23	1.02	0.92	4.53
114	-1.9068	0.33	0.29	1.06	1.04	5.07
116	-2.3645	0.30	0.16	1.07	0.74	5.53
118	-2.4703	0.31	0.15	1.05	0.91	5.40
_ 119	-2.5756	0.30	0.13	1.06	0.79	5.90
		CYCLE 1071	22 DAYS, 7.50 HOURS			
120	-1.7794	0.31	0.17	1.02	1.13	5.05
121	-1.8995	0.31	0.16	1.00	1.20	5.10
122	-2.0321	0.31	0.21	0.97	1.38	5.18
124	-2.3213	0.31	0.27	0.89	1.72	5.66
_ 125	-2.4438	0.30	0.30	0.83	1.86	5.80
		CYCLE 1072	22 DAYS, 8.00 HOURS			
127	-1.7425	0.31	0.36	0.77	2.20	6.49
129	-1.8764	0.31	0.37	0.76	2.29	6.69
131	-2.2158	0.31	0.36	0.75	2.66	7.15
133	-2.4483	0.31	0.34	0.75	3.00	7.61
_ 136	-2.5338	0.31	0.32	0.73	3.46	8.11
		CYCLE 1073	22 DAYS, 8.50 HOURS			
138	-2.1132	0.30	0.26	0.71	3.72	8.48
_ 140	-2.3236	0.31	0.26	0.73	4.11	9.21
		CYCLE 1074	22 DAYS, 9.00 HOURS			
141	-1.0072	0.28	0.07	0.73	3.69	9.36

LOW SLACK PREDICTIONS

JUNCTION NUMBER	HEAD (FT)	CONCENTRATION FACTORS 1ST. CONSTIT. (MGL)	2ND. CONSTIT. (MGL)	3RD. CONSTIT. (MGL)	4TH. CONSTIT. (MGL)	5TH. CONSTIT. (MGL)
		CYCLE 1089	22 DAYS, 16.50 HOURS			
11	-1.2192	0.30	0.09	1.51	0.06	5.93
		CYCLE 1090	22 DAYS, 17.00 HOURS			
20	-1.3777	0.39	0.12	1.79	0.16	5.23
		CYCLE 1091	22 DAYS, 17.50 HOURS			
22	-0.9386	0.41	0.13	1.85	0.20	5.00
23	-1.2377	0.43	0.13	1.88	0.24	4.72
24	-1.5188	0.43	0.13	1.90	0.27	4.41
25	-1.8053	0.43	0.11	1.85	0.28	4.08
		CYCLE 1092	22 DAYS, 18.00 HOURS			
26	-1.0253	0.43	0.11	1.84	0.30	3.58
28	-1.4369	0.42	0.10	1.83	0.38	3.12
29	-1.7065	0.42	0.12	1.81	0.52	2.60
30	-1.8949	0.42	0.16	1.78	0.71	2.23
58	-1.1356	0.42	0.09	1.83	0.27	3.82
59	-1.3513	0.42	0.10	1.82	0.39	3.05
60	-1.6776	0.41	0.12	1.79	0.52	2.59
61	-1.8511	0.41	0.15	1.76	0.69	2.15
62	-1.9725	0.40	0.19	1.70	0.84	1.99
89	-1.1430	0.42	0.10	1.83	0.23	4.56
91	-1.6110	0.42	0.09	1.82	0.33	4.00
64	-2.2459	0.39	0.27	1.59	1.17	1.78
93	-1.8828	0.41	0.10	1.79	0.40	3.17
		CYCLE 1093	22 DAYS, 18.50 HOURS			
31	-1.0008	0.40	0.20	1.72	0.90	2.04
32	-1.2236	0.40	0.24	1.66	0.98	2.00

33	-1.4072	0.39	0.27	1.63	1.11	1.91
36	-2.0356	0.40	0.40	1.33	2.02	1.49
37	-2.1431	0.42	0.43	1.32	2.28	1.60
38	-2.2228	0.44	0.47	1.29	2.65	1.82
63	-1.1007	0.39	0.23	1.65	0.99	1.85
64	-1.3335	0.39	0.27	1.59	1.16	1.77
65	-1.5711	0.39	0.30	1.53	1.32	1.66
66	-1.7733	0.39	0.36	1.43	1.56	1.56
67	-1.9756	0.40	0.40	1.34	1.95	1.42
67	-1.9756	0.40	0.40	1.34	1.95	1.42
69	-2.1723	0.43	0.45	1.30	2.41	1.72
96	-1.5915	0.39	0.18	1.69	0.82	2.48
98	-1.8576	0.38	0.35	1.43	1.52	1.61
99	-2.0251	0.40	0.40	1.35	1.88	1.58
100	-2.1613	0.40	0.39	1.44	1.61	2.13

CICLE 1094 22 DAYS, 19.00 HOURS

39	-1.4065	0.42	0.45	1.23	2.35	1.96
40	-1.4829	0.41	0.46	1.15	2.25	2.03
41	-1.5556	0.39	0.44	1.07	2.13	2.12
42	-1.6881	0.41	0.47	1.11	2.24	2.47
43	-1.8206	0.42	0.48	1.13	2.43	2.56
44	-1.9186	0.44	0.48	1.10	2.75	2.88
45	-2.0415	0.38	0.45	1.04	1.69	2.92
46	-2.1564	0.38	0.43	1.01	1.71	3.17
47	-2.2720	0.38	0.41	1.01	1.75	3.69
70	-1.3640	0.43	0.45	1.27	2.38	1.84
71	-1.4366	0.44	0.48	1.22	2.38	1.96
79	-2.3243	0.40	0.39	1.08	1.76	4.37
73	-1.6310	0.41	0.48	1.12	2.17	2.50
74	-1.7606	0.42	0.48	1.12	2.18	2.70
75	-1.8592	0.40	0.47	1.09	1.96	2.96

76	-1.9787	0.38	0.45	1.05	1.62	3.23
77	-2.0961	0.39	0.44	1.03	1.74	3.61
78	-2.2153	0.39	0.43	1.05	1.77	4.00
101	-1.3701	0.39	0.39	1.36	1.71	2.32
102	-1.5309	0.40	0.41	1.27	1.81	2.15
103	-1.6593	0.42	0.46	1.17	2.10	2.25
104	-1.8233	0.44	0.50	1.13	2.25	2.77
105	-1.9742	0.45	0.52	1.16	2.36	2.99
106	-2.0786	0.45	0.52	1.14	2.43	3.41
107	-2.2044	0.41	0.50	1.17	1.71	3.97
108	-2.2624	0.40	0.46	1.09	1.70	4.24
		CICLE 1095	22 DAIS, 19.50 HOURS			
48	-1.4065	0.40	0.42	1.08	1.80	4.11
49	-1.5836	0.39	0.38	1.08	1.73	4.47
50	-1.7144	0.39	0.36	1.06	1.82	4.63
52	-2.0481	0.29	0.17	1.02	0.71	5.30
54	-2.2431	0.31	0.14	1.06	0.82	5.94
56	-2.4642	0.31	0.15	1.04	0.98	5.75
57	-2.5313	0.32	0.16	1.03	1.09	5.69
79	-1.3876	0.39	0.40	1.08	1.75	4.32
80	-1.5299	0.37	0.33	1.07	1.52	4.72
81	-1.6606	0.34	0.26	1.05	1.25	5.10
82	-1.7724	0.31	0.17	1.06	0.84	5.76
92	0.9132	0.41	0.09	1.80	0.36	3.57
84	-2.0718	0.31	0.15	1.06	0.85	5.88
85	-2.1998	0.31	0.14	1.06	0.84	5.97
86	-2.3269	0.31	0.15	1.05	0.92	5.93
87	-2.4237	0.31	0.15	1.04	1.00	5.77
88	-2.4943	0.32	0.16	1.03	1.09	5.60
109	-1.5309	0.36	0.44	1.03	1.40	4.45
111	-1.6528	0.32	0.34	0.99	1.16	4.26

112	-1.7038	0.31	0.23	1.02	0.92	5.24
114	-1.9068	0.33	0.29	1.06	1.04	6.21
116	-2.3645	0.30	0.16	1.07	0.74	6.75
118	-2.4703	0.31	0.15	1.05	0.91	6.47
_ 119	-2.5756	0.30	0.13	1.06	0.79	7.39
		CYCLE 1096	22 DAYS, 20.00 HOURS			
120	-1.7794	0.31	0.17	1.02	1.13	5.58
121	-1.8995	0.31	0.18	1.00	1.20	5.54
122	-2.0321	0.31	0.21	0.97	1.38	5.54
124	-2.3213	0.31	0.27	0.89	1.72	5.83
_ 125	-2.4438	0.30	0.30	0.83	1.86	6.03
		CYCLE 1097	22 DAYS, 20.50 HOURS			
127	-1.7425	0.31	0.36	0.77	2.20	6.62
129	-1.8764	0.31	0.37	0.76	2.29	6.79
131	-2.2158	0.31	0.36	0.75	2.66	7.26
133	-2.4483	0.31	0.34	0.75	3.00	7.73
_ 136	-2.5338	0.31	0.32	0.73	3.46	8.26
		CYCLE 1098	22 DAYS, 21.00 HOURS			
138	-2.1132	0.30	0.26	0.71	3.72	8.67
140	-2.3236	0.31	0.26	0.73	4.11	9.12
		CYCLE 1099	22 DAYS, 21.50 HOURS			
141	-1.0072	0.26	0.07	0.73	3.69	9.24

THE TEMPERATURE FROM CYCLE 1101 THROUGH CYCLE 2400 IS 25.0 DEGREES C

REOXYGENATION CONSTANT FOR CONSTITUENT 5 COMPUTED BY O'CONNOR-DOBBINS RELATIONSHIP K2 = 12.9*V**0.5 / H**1.5
K1 AND K2 HAVE BEEN CORRECTED TO 25.00 DEGREES CENTIGRADE

THE DO SATURATION FOR CONSTITUENT 5 AT 25.00 DEG.C IS 8.176

THE SOD RATE (BENTH) IS MODIFIED BY TEMP AND DO AS FOLLOWS
FOR DO LEVELS ABOVE 2.00 MG/L, THE SOD RATE IS UNCHANGED
FOR DO LEVELS BELOW 2.00 SOD = BENTH*(DO/ 2.00)** 0.45
THE THETA USED FOR TEMPERATURE CORRECTION IS 1.050

TABLE OF DECAY RATES (AT 25. C)

SIMULATION PERIOD : JULY 12 -23, 1976

CONSTITUENT 1 IS NOPG (MG/L)

CONSTITUENT 2 IS NH3 (MG/L)

CONSTITUENT 3 IS NO3 (MG/L)

CONSTITUENT 4 IS CBOD (MG/L)

CONSTITUENT 5 IS DO (MG/L)

	******** PRIMARY DECAY RATES 1/DAY (BASE E) *******					SECONDARY DECAY 1/DAY		********** SPECIAL DO BUDGET RATES AND PARAMETERS **********							
NODE	CONST1	CONST2	CONST3	CONST4	CONST5	CONST4	CONST1	WINDSP MPH	WINDOX 1/DAY	SOD G/MM/D	CHLORO UG/L	PHOTO MG/CHLORO/D	RESP	DEPTHP FT	DEPTH FT
1	0.088	0.040	0.042	0.289	0.292	0.050	0.120	0.0	0.0	1.28	20.00	0.119	0.018	5.00	14.00
2	0.088	0.300	0.042	0.289	0.204	0.050	0.120	0.0	0.0	1.28	20.00	0.119	0.018	5.00	19.04
3	0.088	0.040	0.042	0.289	0.103	0.050	0.120	0.0	0.0	1.28	20.00	0.119	0.018	5.00	24.33
4	0.088	0.040	0.042	0.289	0.088	0.050	0.120	0.0	0.0	1.28	20.00	0.119	0.018	5.00	29.89
5	0.088	0.040	0.042	0.289	0.120	0.050	0.120	0.0	0.0	1.28	20.00	0.119	0.018	5.00	29.94
6	0.088	0.040	0.042	0.289	0.122	0.050	0.120	0.0	0.0	1.28	20.00	0.119	0.018	5.00	29.83
7	0.088	0.040	0.042	0.289	0.145	0.050	0.120	0.0	0.0	1.28	20.00	0.119	0.018	5.00	27.23
8	0.088	0.040	0.042	0.289	0.190	0.050	0.120	0.0	0.0	1.28	20.00	0.119	0.018	5.00	23.62
9	0.088	0.040	0.042	0.289	0.225	0.050	0.120	0.0	0.0	1.28	20.00	0.119	0.018	5.00	21.44
10	0.088	0.040	0.042	0.289	0.178	0.050	0.120	0.0	0.0	1.28	20.00	0.119	0.018	5.00	19.86
11	0.088	0.300	0.042	0.289	0.217	0.020	0.120	0.0	0.0	0.77	20.00	0.119	0.018	5.00	18.57
12	0.088	0.300	0.042	0.289	0.266	0.020	0.120	0.0	0.0	0.77	20.00	0.119	0.018	5.00	17.18
13	0.088	0.300	0.042	0.289	0.249	0.020	0.120	0.0	0.0	0.77	20.00	0.119	0.018	5.00	17.63
14	0.088	0.040	0.042	0.289	0.524	0.050	0.120	0.0	0.0	1.28	20.00	0.119	0.018	5.00	9.30
15	0.088	0.040	0.042	0.289	0.555	0.050	0.120	0.0	0.0	1.28	20.00	0.119	0.018	5.00	9.36
16	0.088	0.040	0.042	0.289	0.322	0.050	0.120	0.0	0.0	1.28	20.00	0.119	0.018	5.00	9.07
17	0.088	0.040	0.042	0.289	0.227	0.050	0.120	0.0	0.0	1.28	20.00	0.119	0.018	5.00	9.07
18	0.088	0.300	0.042	0.289	0.402	0.020	0.120	0.0	0.0	0.77	20.00	0.119	0.018	5.00	12.77
19	0.088	0.300	0.042	0.289	0.461	0.020	0.120	0.0	0.0	0.77	20.00	0.119	0.018	5.00	9.23
20	0.088	0.300	0.042	0.289	0.250	0.020	0.120	0.0	0.0	0.77	20.00	0.119	0.018	5.00	18.15
21	0.088	0.300	0.042	0.289	0.346	0.020	0.120	0.0	0.0	0.77	20.00	0.119	0.018	5.00	12.68
22	0.088	0.300	0.042	0.289	0.239	0.020	0.120	0.0	0.0	0.77	20.00	0.119	0.018	5.00	17.56
23	0.088	0.300	0.042	0.289	0.202	0.020	0.120	0.0	0.0	0.77	20.00	0.119	0.018	5.00	19.08
24	0.088	0.300	0.042	0.289	0.173	0.020	0.120	0.0	0.0	0.77	20.00	0.119	0.018	5.00	21.07
25	0.088	0.300	0.042	0.289	0.169	0.020	0.120	0.0	0.0	0.77	20.00	0.119	0.018	5.00	21.01
26	0.088	0.300	0.042	0.289	0.092	0.020	0.120	0.0	0.0	0.77	20.00	0.119	0.018	5.00	31.24
27	0.088	0.300	0.042	0.289	0.105	0.020	0.120	0.0	0.0	0.77	20.00	0.119	0.018	5.00	28.99
28	0.088	0.500	0.042	0.289	0.113	0.020	0.120	0.0	0.0	1.28	20.00	0.119	0.018	7.50	27.32
29	0.088	0.500	0.042	0.289	0.101	0.020	0.120	0.0	0.0	1.28	20.00	0.119	0.018	7.50	29.78
30	0.088	0.500	0.042	0.289	0.077	0.020	0.120	0.0	0.0	1.28	20.00	0.119	0.018	7.50	32.30
31	0.088	0.500	0.042	0.289	0.102	0.020	0.120	0.0	0.0	1.28	20.00	0.119	0.018	12.50	28.28
32	0.088	0.500	0.042	0.289	0.123	0.020	0.120	0.0	0.0	1.28	20.00	0.119	0.018	12.50	26.89
33	0.088	0.500	0.042	0.289	0.110	0.020	0.120	0.0	0.0	1.28	20.00	0.119	0.018	12.50	26.22
34	0.088	0.150	0.042	0.289	0.200	0.020	0.120	0.0	0.0	3.45	20.00	0.119	0.018	12.50	14.29

35	0.088	0.150	0.042	0.289	0.418	0.020	0.120	0.0	0.0	3.45	20.00	0.119	0.018	12.50	9.82
36	0.088	0.150	0.042	0.289	0.210	0.020	0.120	0.0	0.0	3.45	20.00	0.119	0.018	12.50	16.22
37	0.088	0.150	0.042	0.289	0.096	0.020	0.150	0.0	0.0	3.45	20.00	0.119	0.018	12.50	27.83
38	0.088	0.150	0.042	0.289	0.067	0.070	0.150	0.0	0.0	3.45	20.00	0.119	0.018	12.50	35.02
39	0.088	0.150	0.042	0.289	0.086	0.070	0.150	0.0	0.0	3.45	20.00	0.119	0.018	12.50	27.75
40	0.088	0.150	0.042	0.289	0.068	0.070	0.150	0.0	0.0	3.45	20.00	0.119	0.018	12.50	33.73
41	0.088	0.150	0.042	0.289	0.107	0.070	0.150	0.0	0.0	3.45	20.00	0.119	0.018	12.50	24.76
42	0.088	0.150	0.042	0.289	0.237	0.070	0.150	0.0	0.0	3.45	20.00	0.119	0.018	12.50	15.52
43	0.088	0.150	0.042	0.289	0.101	0.070	0.150	0.0	0.0	3.45	20.00	0.119	0.018	12.50	27.18
44	0.088	0.060	0.042	0.289	0.072	0.070	0.150	0.0	0.0	5.11	20.00	0.119	0.018	12.50	35.10
45	0.088	0.060	0.042	0.289	0.085	0.070	0.150	0.0	0.0	5.11	20.00	0.119	0.018	16.00	31.70
46	0.088	0.060	0.042	0.289	0.091	0.070	0.150	0.0	0.0	5.11	20.00	0.119	0.018	16.00	30.62
47	0.088	0.060	0.042	0.289	0.093	0.070	0.150	0.0	0.0	5.11	20.00	0.119	0.018	16.00	30.49
48	0.088	0.060	0.042	0.289	0.086	0.070	0.150	0.0	0.0	5.11	20.00	0.119	0.018	16.00	32.68
49	0.088	0.060	0.042	0.289	0.089	0.070	0.150	0.0	0.0	5.11	20.00	0.119	0.018	16.00	31.15
50	0.088	0.060	0.042	0.289	0.079	0.070	0.150	0.0	0.0	5.11	20.00	0.119	0.018	16.00	32.25
51	0.088	0.060	0.042	0.289	0.103	0.070	0.150	0.0	0.0	5.11	20.00	0.119	0.018	16.00	26.97
52	0.088	0.060	0.042	0.289	0.132	0.070	0.150	0.0	0.0	5.11	20.00	0.119	0.018	16.00	20.83
53	0.088	0.060	0.042	0.289	0.094	0.070	0.150	0.0	0.0	5.11	20.00	0.119	0.018	16.00	27.27
54	0.088	0.060	0.042	0.289	0.112	0.070	0.150	0.0	0.0	5.11	20.00	0.119	0.018	16.00	24.95
55	0.088	0.300	0.042	0.289	0.143	0.070	0.150	0.0	0.0	1.28	20.00	0.119	0.018	16.00	20.92
56	0.088	0.300	0.042	0.289	0.131	0.070	0.150	0.0	0.0	1.28	20.00	0.119	0.018	16.00	20.60
57	0.088	0.300	0.042	0.289	0.108	0.070	0.150	0.0	0.0	1.28	80.00	0.119	0.018	16.00	25.55
58	0.088	0.300	0.042	0.289	0.169	0.020	0.120	0.0	0.0	0.77	20.00	0.119	0.018	5.00	19.18
59	0.088	0.500	0.042	0.289	0.126	0.020	0.120	0.0	0.0	1.28	20.00	0.119	0.018	7.50	26.23
60	0.088	0.500	0.042	0.289	0.097	0.020	0.120	0.0	0.0	1.28	20.00	0.119	0.018	7.50	29.54
61	0.088	0.500	0.042	0.289	0.056	0.020	0.120	0.0	0.0	1.28	20.00	0.119	0.018	7.50	41.34
62	0.088	0.500	0.042	0.289	0.069	0.020	0.120	0.0	0.0	1.28	20.00	0.119	0.018	12.50	36.11
63	0.088	0.500	0.042	0.289	0.079	0.020	0.120	0.0	0.0	1.28	20.00	0.119	0.018	12.50	36.79
64	0.088	0.500	0.042	0.289	0.108	0.020	0.120	0.0	0.0	1.28	20.00	0.119	0.018	12.50	29.78
65	0.088	0.500	0.042	0.289	0.081	0.020	0.120	0.0	0.0	3.45	20.00	0.119	0.018	12.50	35.77
66	0.088	0.150	0.042	0.289	0.075	0.020	0.120	0.0	0.0	2.04	20.00	0.119	0.018	12.50	36.31
67	0.088	0.150	0.042	0.289	0.073	0.020	0.120	0.0	0.0	2.04	20.00	0.119	0.018	12.50	36.68
68	0.088	0.150	0.042	0.289	0.058	0.020	0.150	0.0	0.0	2.04	20.00	0.119	0.018	12.50	41.89
69	0.088	0.150	0.042	0.289	0.055	0.070	0.150	0.0	0.0	2.04	20.00	0.119	0.018	12.50	41.51
70	0.088	0.150	0.042	0.289	0.064	0.070	0.150	0.0	0.0	2.04	20.00	0.119	0.018	12.50	35.35
71	0.088	0.150	0.042	0.289	0.080	0.070	0.150	0.0	0.0	2.04	20.00	0.119	0.018	12.50	29.52
72	0.088	0.150	0.042	0.289	0.075	0.070	0.150	0.0	0.0	2.04	20.00	0.119	0.018	12.50	32.96
73	0.088	0.150	0.042	0.289	0.069	0.070	0.150	0.0	0.0	2.04	20.00	0.119	0.018	12.50	31.05
74	0.088	0.150	0.042	0.289	0.088	0.070	0.150	0.0	0.0	2.04	20.00	0.119	0.018	12.50	32.12
75	0.088	0.060	0.042	0.289	0.057	0.070	0.150	0.0	0.0	3.45	20.00	0.119	0.018	12.50	40.51
76	0.088	0.060	0.042	0.289	0.060	0.070	0.150	0.0	0.0	3.45	20.00	0.119	0.018	16.00	41.10
77	0.088	0.060	0.042	0.289	0.064	0.070	0.150	0.0	0.0	3.45	20.00	0.119	0.018	16.00	38.99
78	0.088	0.060	0.042	0.289	0.064	0.070	0.150	0.0	0.0	3.45	20.00	0.119	0.018	16.00	39.46
79	0.088	0.060	0.042	0.289	0.074	0.070	0.150	0.0	0.0	3.45	20.00	0.119	0.018	16.00	37.30
80	0.088	0.060	0.042	0.289	0.081	0.070	0.150	0.0	0.0	3.45	20.00	0.119	0.018	16.00	33.85
81	0.088	0.060	0.042	0.289	0.069	0.070	0.150	0.0	0.0	3.45	20.00	0.119	0.018	16.00	37.08
82	0.088	0.060	0.042	0.289	0.059	0.070	0.150	0.0	0.0	3.45	20.00	0.119	0.018	16.00	39.41
83	0.088	0.060	0.042	0.289	0.068	0.070	0.150	0.0	0.0	3.45	20.00	0.119	0.018	16.00	39.46
84	0.088	0.060	0.042	0.289	0.076	0.070	0.150	0.0	0.0	3.45	20.00	0.119	0.018	16.00	36.57
85	0.088	0.060	0.042	0.289	0.074	0.070	0.150	0.0	0.0	3.45	20.00	0.119	0.018	16.00	35.11
86	0.088	0.300	0.042	0.289	0.078	0.070	0.150	0.0	0.0	1.28	20.00	0.119	0.018	16.00	33.30
87	0.088	0.300	0.042	0.289	0.077	0.070	0.150	0.0	0.0	1.28	20.00	0.119	0.018	16.00	31.78
88	0.088	0.300	0.042	0.289	0.074	0.070	0.150	0.0	0.0	1.28	80.00	0.119	0.018	16.00	32.85
89	0.088	0.300	0.042	0.289	0.225	0.020	0.120	0.0	0.0	0.77	20.00	0.119	0.018	5.00	15.58
90	0.088	0.300	0.042	0.289	0.201	0.020	0.120	0.0	0.0	0.77	20.00	0.119	0.018	5.00	16.26
91	0.088	0.500	0.042	0.289	0.342	0.020	0.120	0.0	0.0	1.28	20.00	0.119	0.018	7.50	11.11
92	0.088	0.500	0.042	0.289	0.214	0.020	0.120	0.0	0.0	1.28	20.00	0.119	0.018	7.50	13.78
93	0.088	0.500	0.042	0.289	0.106	0.020	0.120	0.0	0.0	1.28	20.00	0.119	0.018	7.50	21.13
94	0.088	0.500	0.042	0.289	0.210	0.020	0.120	0.0	0.0	1.28	20.00	0.119	0.018	12.50	14.96
95	0.088	0.500	0.042	0.289	0.556	0.020	0.120	0.0	0.0	1.28	20.00	0.119	0.018	12.50	7.98

96	0.088	0.500	0.042	0.289	0.227	0.020	0.120	0.0	0.0	1.28	20.00	0.119	0.018	12.50	13.16
97	0.088	0.500	0.042	0.289	0.180	0.020	0.120	0.0	0.0	2.04	20.00	0.119	0.018	12.50	19.47
98	0.088	0.150	0.042	0.289	0.101	0.020	0.120	0.0	0.0	1.28	20.00	0.119	0.018	12.50	29.74
99	0.088	0.150	0.042	0.289	0.089	0.020	0.120	0.0	0.0	1.28	20.00	0.119	0.018	12.50	30.73
100	0.088	0.150	0.042	0.289	0.169	0.020	0.150	0.0	0.0	1.28	20.00	0.119	0.018	12.50	16.95
101	0.088	0.150	0.042	0.289	0.217	0.070	0.150	0.0	0.0	1.28	20.00	0.119	0.018	12.50	12.88
102	0.088	0.150	0.042	0.289	0.167	0.070	0.150	0.0	0.0	1.28	20.00	0.119	0.018	12.50	16.29
103	0.088	0.150	0.042	0.289	0.135	0.070	0.150	0.0	0.0	1.28	20.00	0.119	0.018	12.50	20.26
104	0.088	0.150	0.042	0.289	0.129	0.070	0.150	0.0	0.0	1.28	20.00	0.119	0.018	12.50	23.69
105	0.088	0.060	0.042	0.289	0.102	0.070	0.150	0.0	0.0	1.28	20.00	0.119	0.018	12.50	27.32
106	0.088	0.060	0.042	0.289	0.091	0.070	0.150	0.0	0.0	1.28	20.00	0.119	0.018	16.00	27.69
107	0.088	0.060	0.042	0.289	0.098	0.070	0.150	0.0	0.0	1.28	20.00	0.119	0.018	16.00	25.67
108	0.088	0.060	0.042	0.289	0.110	0.070	0.150	0.0	0.0	1.28	20.00	0.119	0.018	16.00	25.47
109	0.088	0.060	0.042	0.289	0.294	0.070	0.150	0.0	0.0	1.28	20.00	0.119	0.018	16.00	13.05
110	0.088	0.040	0.042	0.289	0.338	0.050	0.120	0.0	0.0	1.28	20.00	0.119	0.018	5.00	10.42
111	0.088	0.060	0.042	0.289	0.191	0.070	0.150	0.0	0.0	1.28	20.00	0.119	0.018	16.00	14.49
112	0.088	0.060	0.042	0.289	0.126	0.070	0.150	0.0	0.0	1.28	20.00	0.119	0.018	16.00	21.43
113	0.088	0.060	0.042	0.289	0.183	0.070	0.150	0.0	0.0	1.28	20.00	0.119	0.018	16.00	16.51
114	0.088	0.060	0.042	0.289	0.163	0.070	0.150	0.0	0.0	1.28	20.00	0.119	0.018	16.00	15.42
115	0.088	0.060	0.042	0.289	0.312	0.070	0.150	0.0	0.0	1.28	20.00	0.119	0.018	16.00	11.05
116	0.088	0.060	0.042	0.289	0.134	0.070	0.150	0.0	0.0	1.28	20.00	0.119	0.018	16.00	18.64
117	0.088	0.300	0.042	0.289	0.130	0.070	0.150	0.0	0.0	1.28	20.00	0.119	0.018	16.00	18.13
118	0.088	0.300	0.042	0.289	0.180	0.070	0.150	0.0	0.0	1.28	20.00	0.119	0.018	16.00	16.18
119	0.088	0.300	0.042	0.289	0.250	0.070	0.150	0.0	0.0	1.28	80.00	0.119	0.018	16.00	12.04
120	0.088	0.300	0.042	0.226	0.108	0.020	0.070	0.0	0.0	1.28	80.00	0.119	0.018	16.00	25.75
121	0.088	0.300	0.042	0.226	0.113	0.020	0.070	0.0	0.0	0.64	80.00	0.119	0.018	16.00	24.18
122	0.088	0.300	0.042	0.226	0.109	0.020	0.070	0.0	0.0	0.64	80.00	0.119	0.018	12.50	24.16
123	0.088	0.300	0.042	0.226	0.095	0.020	0.070	0.0	0.0	0.64	45.00	0.119	0.018	12.50	26.80
124	0.088	0.300	0.042	0.226	0.126	0.020	0.070	0.0	0.0	0.64	45.00	0.119	0.018	12.50	22.34
125	0.088	0.300	0.042	0.226	0.092	0.020	0.070	0.0	0.0	0.64	45.00	0.119	0.018	12.50	27.72
126	0.088	0.300	0.042	0.226	0.096	0.020	0.070	0.0	0.0	0.64	45.00	0.119	0.018	9.00	26.92
127	0.088	0.300	0.042	0.226	0.106	0.020	0.070	0.0	0.0	0.64	15.00	0.119	0.018	9.00	25.96
128	0.088	0.300	0.042	0.226	0.188	0.020	0.070	0.0	0.0	0.64	15.00	0.119	0.018	9.00	14.28
129	0.088	0.060	0.042	0.226	0.102	0.020	0.070	0.0	0.0	0.64	15.00	0.119	0.018	9.00	25.49
130	0.088	0.060	0.042	0.226	0.090	0.020	0.070	0.0	0.0	0.64	15.00	0.119	0.018	9.00	27.56
131	0.088	0.060	0.042	0.226	0.080	0.020	0.070	0.0	0.0	1.28	15.00	0.119	0.018	9.00	29.36
132	0.088	0.060	0.042	0.226	0.087	0.020	0.070	0.0	0.0	1.28	15.00	0.119	0.018	9.00	26.81
133	0.088	0.060	0.042	0.226	0.107	0.020	0.070	0.0	0.0	1.28	15.00	0.119	0.018	9.00	22.62
134	0.088	0.060	0.042	0.226	0.096	0.020	0.070	0.0	0.0	1.28	15.00	0.119	0.018	9.00	23.67
135	0.088	0.060	0.042	0.226	0.199	0.020	0.070	0.0	0.0	1.28	15.00	0.119	0.018	9.00	11.68
136	0.088	0.060	0.042	0.226	0.129	0.020	0.070	0.0	0.0	1.28	15.00	0.119	0.018	9.00	19.20
137	0.088	0.060	0.042	0.226	0.143	0.020	0.070	0.0	0.0	1.28	15.00	0.119	0.018	9.00	17.28
138	0.088	0.040	0.042	0.226	0.127	0.020	0.070	0.0	0.0	1.28	15.00	0.119	0.018	9.00	16.99
139	0.088	0.040	0.042	0.226	0.128	0.020	0.070	0.0	0.0	3.19	15.00	0.119	0.018	9.00	16.72
140	0.088	0.040	0.042	0.226	0.150	0.070	0.070	0.0	0.0	3.19	15.00	0.119	0.018	15.00	16.06
141	0.088	0.040	0.042	0.226	0.200	0.070	0.070	0.0	0.0	3.19	15.00	0.119	0.018	15.00	13.94
142	0.088	0.040	0.042	0.289	0.181	0.050	0.120	0.0	0.0	1.28	20.00	0.119	0.018	5.00	13.18
143	0.088	0.040	0.042	0.289	0.249	0.050	0.120	0.0	0.0	1.28	20.00	0.119	0.018	5.00	11.79
144	0.088	0.040	0.042	0.289	0.306	0.050	0.120	0.0	0.0	1.28	20.00	0.119	0.018	5.00	10.66
145	0.088	0.040	0.042	0.289	0.309	0.050	0.120	0.0	0.0	1.28	20.00	0.119	0.018	5.00	10.07
146	0.088	0.040	0.042	0.289	0.266	0.050	0.120	0.0	0.0	1.28	20.00	0.119	0.018	5.00	7.59
147	0.088	0.040	0.042	0.289	0.482	0.050	0.120	0.0	0.0	1.28	20.00	0.119	0.018	5.00	7.56
148	0.088	0.040	0.042	0.289	0.101	0.050	0.120	0.0	0.0	1.28	20.00	0.119	0.018	5.00	16.86
149	0.088	0.040	0.042	0.289	0.057	0.050	0.120	0.0	0.0	1.28	20.00	0.119	0.018	5.00	17.03
150	0.088	0.040	0.042	0.289	0.129	0.050	0.120	0.0	0.0	1.28	20.00	0.119	0.018	5.00	13.92
151	0.088	0.040	0.042	0.289	0.565	0.050	0.120	0.0	0.0	1.28	20.00	0.119	0.018	5.00	6.44
152	0.088	0.040	0.042	0.289	0.147	0.050	0.120	0.0	0.0	1.28	20.00	0.119	0.018	5.00	10.85
153	0.088	0.040	0.042	0.289	0.164	0.050	0.120	0.0	0.0	1.28	20.00	0.119	0.018	5.00	12.01
154	0.088	0.040	0.042	0.289	0.150	0.050	0.120	0.0	0.0	1.28	20.00	0.119	0.018	5.00	11.46
155	0.088	0.040	0.042	0.289	0.257	0.050	0.120	0.0	0.0	1.28	20.00	0.119	0.018	5.00	7.96
156	0.088	0.040	0.042	0.289	0.106	0.050	0.120	0.0	0.0	1.28	20.00	0.119	0.018	5.00	15.83

TEMPERATURE CORRECTION FACTORS , THETA

1.047 1.085 1.160 1.047 1.025 1.000 1.000 1.000 1.000 1.050 1.000 1.085 1.085 1.000 1.000

RESTART DECK TAPE WAS LAST WRITTEN AFTER CYCLE 1250
HYDRAULIC CYCLE ON EXTRACT TAPE FOR RESTARTING = 560
NTAG = 4

HIGH SLACK PREDICTIONS

JUNCTION NUMBER	HEAD (FT)	CONCENTRATION FACTORS 1ST. CONSTIT. (MGL)	2ND. CONSTIT. (MGL)	3RD. CONSTIT. (MGL)	4TH. CONSTIT. (MGL)	5TH. CONSTIT. (MGL)
		CYCLE 1400	29 DAYS, 4.00 HOURS			
- 11	1.7708	0.22	0.10	1.52	0.0	5.75
		CYCLE 1401	29 DAYS, 4.50 HOURS			
- 20	1.9417	0.26	0.10	1.32	0.03	5.85
		CYCLE 1402	29 DAYS, 5.00 HOURS			
22	1.6314	0.32	0.13	1.51	0.08	5.61
23	1.8438	0.35	0.15	1.60	0.11	5.46
24	2.0258	0.38	0.17	1.72	0.14	5.27
25	2.2051	0.40	0.18	1.78	0.18	5.03
26	2.3014	0.42	0.19	1.81	0.22	4.84
58	2.3542	0.41	0.18	1.82	0.21	4.74
- 89	2.3379	0.41	0.17	1.82	0.21	4.59
		CYCLE 1403	29 DAYS, 5.50 HOURS			
28	1.9276	0.42	0.16	1.80	0.25	3.98
29	2.0954	0.41	0.15	1.79	0.27	3.61
30	2.2245	0.42	0.15	1.79	0.29	3.43
31	2.3222	0.41	0.15	1.77	0.40	3.16
32	2.4523	0.41	0.16	1.76	0.43	2.91
33	2.5725	0.40	0.19	1.72	0.56	2.55
59	1.8084	0.42	0.18	1.82	0.23	4.41
60	2.0701	0.42	0.16	1.80	0.24	4.13
61	2.1896	0.41	0.15	1.79	0.26	3.76
62	2.2811	0.41	0.14	1.78	0.27	3.53
63	2.3809	0.41	0.15	1.77	0.31	3.22
64	2.4036	0.38	0.29	1.56	0.87	2.13
65	2.6392	0.40	0.18	1.72	0.52	2.57

91	2.0198	0.41	0.14	1.78	0.25	4.19
92	2.1178	0.40	0.14	1.76	0.30	3.61
93	2.2009	0.40	0.15	1.72	0.36	3.11
96	2.6419	0.38	0.21	1.65	0.62	2.88
		CYCLE 1404	29 DAYS, 6.00 HOURS			
36	2.3774	0.38	0.30	1.58	0.87	2.20
37	2.4562	0.38	0.32	1.54	0.95	2.06
38	2.5158	0.40	0.38	1.50	1.38	2.01
39	2.5746	0.37	0.38	1.45	1.21	1.98
40	2.6288	0.37	0.41	1.38	1.28	1.72
41	2.6802	0.39	0.48	1.29	1.75	1.72
42	2.7596	0.40	0.51	1.25	2.08	1.89
43	2.8352	0.41	0.53	1.22	2.20	2.06
44	2.9026	0.44	0.55	1.18	2.91	2.33
45	2.9831	0.41	0.54	1.11	2.39	2.60
66	2.1954	0.39	0.21	1.69	0.60	2.41
72	2.6586	0.37	0.43	1.35	1.40	1.67
68	2.4054	0.38	0.29	1.56	0.85	2.13
69	2.4771	0.38	0.32	1.54	0.96	2.06
70	2.5468	0.38	0.36	1.49	1.11	1.98
71	2.5963	0.37	0.39	1.43	1.14	1.84
72	2.6586	0.37	0.43	1.35	1.40	1.67
73	2.7262	0.38	0.47	1.30	1.71	1.67
74	2.8010	0.40	0.50	1.27	2.03	1.73
75	2.8640	0.41	0.53	1.23	2.18	2.05
76	2.9418	0.42	0.54	1.19	2.43	2.26
98	2.2518	0.38	0.27	1.60	0.80	2.22
99	2.3669	0.38	0.30	1.57	0.89	2.11
100	2.4658	0.38	0.43	1.40	1.34	1.96
101	2.5627	0.38	0.47	1.31	1.60	2.14
102	2.6503	0.38	0.48	1.27	1.64	2.20

103	2.7465	0.39	0.51	1.19	1.94	2.40
104	2.8408	0.41	0.53	1.21	2.18	2.29
105	2.9377	0.40	0.53	1.14	2.03	2.60
106	3.0067	0.43	0.56	1.09	2.40	2.99
		CYCLE 1405	29 DAYS, 6.50 HOURS			
46	2.5304	0.40	0.55	1.06	2.25	3.20
47	2.6263	0.40	0.55	1.04	2.22	3.34
48	2.7299	0.40	0.55	1.03	2.19	3.63
49	2.8146	0.39	0.54	1.01	2.02	3.92
50	2.9063	0.37	0.52	0.99	1.73	4.24
52	3.1226	0.44	0.52	0.99	2.38	5.65
54	3.2567	0.39	0.46	0.99	1.83	5.75
56	3.4110	0.32	0.28	1.00	1.08	6.82
57	3.4706	0.31	0.25	1.00	0.94	7.05
77	2.4861	0.41	0.54	1.13	2.29	2.51
78	2.5779	0.40	0.54	1.08	2.22	2.87
83	3.0224	0.38	0.52	0.98	1.78	4.64
80	2.7749	0.41	0.56	1.05	2.32	3.50
81	2.8680	0.40	0.56	1.03	2.17	3.72
82	2.9471	0.38	0.53	0.99	1.77	4.05
83	3.0224	0.38	0.52	0.98	1.78	4.64
84	3.1417	0.38	0.52	0.98	1.74	4.86
85	3.2242	0.38	0.50	0.99	1.73	5.24
86	3.3086	0.39	0.49	1.00	1.83	5.46
87	3.3796	0.37	0.41	1.00	1.60	6.00
88	3.4370	0.33	0.31	1.00	1.17	6.71
107	2.5653	0.44	0.59	1.08	2.36	3.54
108	2.6112	0.42	0.56	1.07	2.32	3.65
109	2.7740	0.41	0.57	1.05	2.05	4.38
111	2.8499	0.38	0.53	1.01	1.64	4.91
112	2.8983	0.38	0.53	0.99	1.73	4.46

114	3.0406	0.34	0.41	0.99	1.29	6.00
116	3.3216	0.34	0.36	0.99	1.27	6.45
118	3.4103	0.31	0.26	1.01	0.91	7.13
- 119	3.4850	0.29	0.21	1.00	0.78	7.53
		CYCLE 1406	29 DAYS. 7.00 HOURS			
120	3.0792	0.30	0.23	1.01	0.84	7.35
121	3.1789	0.30	0.21	1.00	0.84	7.23
122	3.2817	0.30	0.22	0.97	1.00	6.62
124	3.5116	0.30	0.25	0.93	1.21	6.00
125	3.6451	0.30	0.28	0.89	1.42	5.67
127	3.8609	0.30	0.32	0.83	1.68	5.44
129	3.9659	0.30	0.36	0.78	1.87	5.65
131	4.1795	0.31	0.40	0.74	2.22	6.07
133	4.3320	0.30	0.38	0.73	2.57	6.48
136	4.4306	0.31	0.35	0.74	3.06	6.98
- 138	4.5231	0.30	0.29	0.72	3.51	7.41
		CYCLE 1407	29 DAYS. 7.50 HOURS			
139	4.4532	0.30	0.28	0.72	3.80	7.61
140	4.5133	0.31	0.29	0.73	4.15	8.08

HIGH SLACK PREDICTIONS

JUNCTION NUMBER	HEAD (FT)	CONCENTRATION FACTORS 1ST. CONSTIT. (MGL)	2ND. CONSTIT. (MGL)	3RD. CONSTIT. (MGL)	4TH. CONSTIT. (MGL)	5TH. CONSTIT. (MGL)
		CYCLE 1425	29 DAYS, 16.50 HOURS			
- 11	1.7708	0.22	0.10	1.52	0.0	5.77
		CYCLE 1426	29 DAYS, 17.00 HOURS			
- 20	1.9417	0.26	0.10	1.32	0.03	5.97
		CYCLE 1427	29 DAYS, 17.50 HOURS			
22	1.6314	0.32	0.13	1.51	0.08	5.78
23	1.8438	0.35	0.15	1.60	0.11	5.62
24	2.0258	0.38	0.17	1.72	0.14	5.42
25	2.2051	0.40	0.18	1.78	0.18	5.16
26	2.3014	0.41	0.19	1.81	0.22	4.96
58	2.3542	0.41	0.18	1.82	0.21	4.87
- 89	2.3379	0.41	0.17	1.81	0.21	4.73
		CYCLE 1428	29 DAYS, 18.00 HOURS			
28	1.9276	0.42	0.16	1.80	0.25	4.10
29	2.0954	0.41	0.15	1.78	0.27	3.73
30	2.2245	0.42	0.15	1.79	0.29	3.55
31	2.3222	0.41	0.16	1.77	0.40	3.31
32	2.4523	0.41	0.16	1.76	0.43	3.06
33	2.5725	0.40	0.19	1.71	0.56	2.74
59	1.8684	0.42	0.18	1.82	0.23	4.53
60	2.0701	0.42	0.16	1.80	0.24	4.27
61	2.1896	0.41	0.15	1.78	0.26	3.91
62	2.2811	0.41	0.14	1.78	0.27	3.67
63	2.3809	0.41	0.15	1.77	0.33	3.36
68	2.9036	0.38	0.29	1.56	0.87	2.38
65	2.6392	0.40	0.18	1.72	0.52	2.73

91	2.0198	0.41	0.14	1.78	0.25	4.49
92	2.1178	0.40	0.14	1.75	0.30	3.90
93	2.2009	0.40	0.15	1.72	0.36	3.31
96	2.6419	0.38	0.21	1.65	0.62	3.40
		CYCLE 1429	29 DAYS, 18.50 HOURS			
36	2.3774	0.38	0.30	1.58	0.87	2.54
37	2.4562	0.38	0.32	1.54	0.95	2.36
38	2.5158	0.40	0.38	1.50	1.38	2.28
39	2.5746	0.37	0.38	1.45	1.21	2.24
40	2.6288	0.37	0.42	1.38	1.28	1.99
41	2.6802	0.39	0.48	1.29	1.75	2.01
42	2.7596	0.40	0.51	1.25	2.08	2.20
43	2.8352	0.41	0.53	1.22	2.20	2.36
44	2.9026	0.44	0.56	1.18	2.91	2.64
45	2.9831	0.41	0.55	1.11	2.39	2.93
66	2.1954	0.39	0.21	1.69	0.60	2.62
72	2.6586	0.37	0.44	1.34	1.40	1.94
68	2.4054	0.38	0.29	1.58	0.85	2.38
69	2.4771	0.38	0.32	1.53	0.96	2.32
70	2.5468	0.38	0.36	1.49	1.11	2.24
71	2.5963	0.37	0.39	1.43	1.14	2.10
72	2.6586	0.37	0.44	1.34	1.40	1.94
73	2.7262	0.38	0.48	1.29	1.71	1.95
74	2.8010	0.40	0.51	1.27	2.03	2.00
75	2.8640	0.41	0.53	1.23	2.18	2.35
76	2.9418	0.42	0.55	1.19	2.43	2.56
98	2.2518	0.38	0.27	1.60	0.80	2.48
99	2.3669	0.38	0.30	1.57	0.89	2.36
100	2.4658	0.38	0.43	1.40	1.34	2.32
101	2.5627	0.38	0.47	1.30	1.60	2.64
102	2.6503	0.38	0.48	1.27	1.64	2.72

103	2.7465	0.39	0.52	1.19	1.94	2.83
104	2.8408	0.41	0.53	1.20	2.18	2.65
105	2.9377	0.40	0.53	1.13	2.03	2.96
106	3.0067	0.43	0.57	1.09	2.40	3.38
		CYCLE 1430	29 DAYS, 19.00 HOURS			
46	2.5304	0.40	0.55	1.05	2.25	3.52
47	2.6263	0.40	0.55	1.04	2.22	3.66
48	2.7299	0.40	0.56	1.03	2.19	3.96
49	2.8146	0.39	0.55	1.01	2.02	4.25
50	2.9063	0.37	0.53	0.99	1.73	4.57
52	3.1226	0.44	0.53	0.99	2.38	6.03
54	3.2567	0.39	0.46	0.99	1.83	6.11
56	3.4110	0.32	0.29	1.00	1.08	7.14
57	3.4706	0.31	0.26	1.00	0.94	7.26
77	2.4861	0.41	0.55	1.12	2.29	2.82
78	2.5779	0.40	0.55	1.07	2.22	3.19
83	3.0224	0.38	0.53	0.98	1.78	4.99
80	2.7749	0.41	0.57	1.05	2.32	3.83
81	2.8680	0.40	0.56	1.02	2.17	4.05
82	2.9471	0.38	0.54	0.99	1.77	4.37
83	3.0224	0.38	0.53	0.98	1.78	4.99
84	3.1417	0.38	0.52	0.98	1.74	5.19
85	3.2242	0.38	0.51	0.99	1.73	5.57
86	3.3086	0.39	0.49	1.00	1.83	5.81
87	3.3796	0.37	0.41	1.00	1.60	6.36
88	3.4370	0.33	0.31	1.00	1.17	6.95
107	2.5653	0.43	0.59	1.07	2.36	3.93
108	2.6112	0.42	0.59	1.06	2.32	4.01
109	2.7740	0.41	0.57	1.04	2.05	4.80
111	2.8499	0.38	0.54	1.01	1.64	5.46
112	2.8983	0.38	0.53	0.99	1.73	4.85

114	3.0406	0.34	0.41	0.98	1.29	6.48
116	3.3216	0.34	0.36	0.99	1.27	6.85
118	3.4103	0.31	0.26	1.00	0.91	7.38
119	3.4850	0.29	0.21	1.00	0.78	9.05
		CYCLE 1431	29 DAYS, 19.50 HOURS			
120	3.0792	0.30	0.23	1.01	0.84	7.59
121	3.1789	0.30	0.21	1.00	0.84	7.90
122	3.2817	0.30	0.22	0.97	1.00	7.68
124	3.5116	0.30	0.25	0.93	1.21	6.88
125	3.6451	0.30	0.28	0.89	1.42	6.35
127	3.8609	0.30	0.32	0.83	1.68	5.96
129	3.9659	0.30	0.36	0.78	1.87	5.96
131	4.1795	0.31	0.40	0.74	2.22	6.21
133	4.3320	0.30	0.38	0.73	2.57	6.60
136	4.4306	0.31	0.35	0.74	3.06	7.11
138	4.5231	0.30	0.29	0.72	3.51	7.62
		CYCLE 1432	29 DAYS, 20.00 HOURS			
139	4.4532	0.30	0.28	0.72	3.80	7.92
140	4.5133	0.31	0.29	0.73	4.15	8.25

RESTART DECK TAPE WAS LAST WRITTEN AFTER CYCLE 1450
HYDRAULIC CYCLE ON EXTRACT TAPE FOR RESTARTING = 560
NTAG = 4

********** WATER QUALITY SUMMARY **********

STARTS AT CYCLE 750 (15 DAYS 15.0 HOURS)

ENDS AT CYCLE 1450 (30 DAYS 5.0 HOURS)

JUNC	CONSTITUENT 1			CONSTITUENT 2			CONSTITUENT 3			CONSTITUENT 4			CONSTITUENT 5		
	MIN	MAX	AVE	MIN	MAX	AVE	MIN	MAX	AVE	MIN	MAX	AVE	MIN	MAX	AVE
1	0.0	0.30	0.30	0.0	0.30	0.30	0.0	1.00	1.00	0.0	2.90*******		0.0	7.00	6.99
2	0.20	0.30	0.25	0.09	0.12	0.10	1.47	1.60	1.53	0.0	2.17	0.56	5.72	6.28	5.98
3	0.02	0.13	0.06	0.01	0.07	0.03	0.09	0.57	0.27	0.00	0.03	0.01	0.72	3.75	1.83
4	0.04	0.13	0.08	0.02	0.06	0.04	0.19	0.62	0.39	0.00	0.03	0.01	1.37	3.45	2.51
5	0.06	0.16	0.11	0.03	0.08	0.05	0.27	0.80	0.52	0.00	0.04	0.01	1.96	4.03	3.09
6	0.08	0.20	0.13	0.04	0.09	0.06	0.37	0.96	0.64	0.01	0.06	0.02	2.55	4.54	3.56
7	0.10	0.22	0.16	0.04	0.10	0.07	0.46	1.10	0.76	0.01	0.07	0.03	3.04	4.93	3.97
8	0.12	0.24	0.18	0.05	0.10	0.07	0.55	1.22	0.89	0.01	0.08	0.03	3.41	5.26	4.33
9	0.14	0.26	0.20	0.06	0.11	0.08	0.66	1.30	1.01	0.02	0.08	0.04	3.75	5.48	4.66
10	0.19	0.27	0.24	0.07	0.11	0.09	0.91	1.37	1.18	0.03	0.09	0.05	4.41	5.66	5.10
11	0.22	0.30	0.26	0.09	0.13	0.10	1.47	1.57	1.51	0.0	0.17	0.04	5.72	6.28	5.95
12	0.28	0.33	0.30	0.09	0.14	0.11	1.45	1.62	1.54	0.01	0.12	0.06	5.66	6.85	6.13
13	0.28	0.35	0.31	0.07	0.15	0.10	1.41	1.63	1.50	0.05	0.13	0.08	5.28	5.95	5.60
14	0.29	0.31	0.30	0.11	0.16	0.13	1.38	1.49	1.43	0.06	0.12	0.08	5.63	6.56	6.14
15	0.28	0.31	0.30	0.11	0.20	0.15	1.27	1.49	1.37	0.04	0.12	0.06	5.94	6.93	6.47
16	0.28	0.30	0.29	0.16	0.21	0.18	1.24	1.34	1.29	0.04	0.07	0.05	6.41	7.00	6.68
17	0.27	0.28	0.28	0.19	0.22	0.20	1.18	1.25	1.21	0.03	0.05	0.03	6.41	7.14	6.71
18	0.27	0.36	0.32	0.06	0.16	0.10	1.39	1.67	1.52	0.06	0.14	0.09	5.29	5.85	5.54
19	0.29	0.34	0.31	0.10	0.16	0.12	1.38	1.58	1.46	0.06	0.12	0.08	5.69	6.75	6.19
20	0.26	0.39	0.33	0.07	0.17	0.11	1.32	1.79	1.55	0.03	0.18	0.10	5.13	5.97	5.58
21	0.31	0.39	0.34	0.09	0.17	0.12	1.45	1.76	1.60	0.06	0.17	0.10	5.22	5.83	5.57
22	0.32	0.41	0.37	0.10	0.18	0.13	1.50	1.85	1.69	0.08	0.22	0.14	4.87	5.78	5.34
23	0.35	0.43	0.39	0.10	0.19	0.14	1.60	1.88	1.76	0.11	0.25	0.18	4.59	5.62	5.12
24	0.38	0.43	0.41	0.12	0.19	0.15	1.72	1.90	1.83	0.14	0.28	0.21	4.27	5.42	4.86
25	0.40	0.43	0.42	0.11	0.18	0.14	1.78	1.89	1.84	0.18	0.29	0.24	3.93	5.17	4.58
26	0.41	0.43	0.43	0.11	0.20	0.15	1.77	1.88	1.84	0.22	0.30	0.26	3.42	4.97	4.23
27	0.41	0.43	0.42	0.09	0.19	0.13	1.76	1.88	1.83	0.23	0.32	0.27	3.21	4.63	3.93
28	0.41	0.43	0.42	0.09	0.17	0.12	1.76	1.86	1.82	0.25	0.38	0.30	2.96	4.11	3.56
29	0.40	0.43	0.42	0.09	0.19	0.12	1.72	1.85	1.81	0.27	0.52	0.36	2.43	3.74	3.21
30	0.40	0.43	0.42	0.10	0.24	0.14	1.67	1.86	1.80	0.29	0.71	0.46	2.04	3.55	2.89
31	0.38	0.43	0.41	0.10	0.29	0.16	1.60	1.84	1.77	0.40	0.90	0.62	1.83	3.31	2.58
32	0.39	0.43	0.41	0.10	0.33	0.19	1.55	1.85	1.74	0.43	0.98	0.70	1.76	3.06	2.35
33	0.38	0.42	0.40	0.12	0.37	0.23	1.50	1.82	1.70	0.56	1.11	0.83	1.65	2.74	2.17
34	0.38	0.43	0.41	0.21	0.50	0.34	1.53	1.75	1.66	0.84	1.26	1.06	1.78	2.78	2.26
35	0.38	0.41	0.40	0.23	0.41	0.30	1.43	1.73	1.62	0.90	1.32	1.07	1.83	2.84	2.32
36	0.37	0.43	0.40	0.21	0.50	0.34	1.22	1.74	1.53	0.87	2.02	1.35	1.24	2.59	1.87
37	0.36	0.43	0.39	0.23	0.53	0.36	1.21	1.70	1.45	0.95	2.28	1.53	1.27	2.38	1.74
38	0.37	0.46	0.41	0.28	0.57	0.41	1.19	1.67	1.42	1.29	2.72	1.89	1.25	2.67	1.76
39	0.35	0.45	0.40	0.28	0.56	0.41	1.13	1.61	1.36	1.20	2.53	1.87	1.16	2.99	1.81
40	0.37	0.45	0.41	0.32	0.56	0.45	1.06	1.56	1.30	1.28	2.48	2.03	1.13	3.11	1.75
41	0.37	0.45	0.40	0.38	0.55	0.45	0.97	1.48	1.19	1.75	2.39	2.12	1.15	3.21	1.80
42	0.26	0.45	0.38	0.28	0.56	0.44	0.64	1.43	1.09	1.73	2.37	2.11	0.94	3.74	1.92
43	0.39	0.47	0.42	0.43	0.57	0.49	1.03	1.40	1.18	2.02	2.92	2.40	1.24	3.88	2.19
44	0.40	0.48	0.44	0.45	0.58	0.50	1.01	1.35	1.15	2.48	3.25	2.76	1.42	4.27	2.47
45	0.37	0.44	0.40	0.45	0.57	0.49	0.97	1.27	1.10	1.69	2.56	2.11	1.59	4.33	2.65
46	0.37	0.43	0.39	0.43	0.56	0.48	0.94	1.20	1.06	1.69	2.29	1.98	2.02	4.62	2.93
47	0.26	0.42	0.36	0.31	0.56	0.44	0.67	1.17	0.96	1.25	2.25	1.80	1.70	5.28	3.05
48	0.34	0.42	0.39	0.40	0.56	0.47	0.86	1.16	1.03	1.60	2.20	1.88	2.35	5.81	3.59

49	0.37	0.43	0.40	0.38	0.55	0.46	0.93	1.13	1.05	1.69	2.05	1.87	2.57	6.17	3.97
50	0.37	0.45	0.40	0.36	0.56	0.45	0.98	1.12	1.05	1.63	2.29	1.91	2.83	6.33	4.26
51	0.44	0.48	0.45	0.43	0.59	0.49	0.98	1.09	1.04	2.36	2.68	2.52	3.68	6.30	4.57
52	0.28	0.45	0.37	0.17	0.53	0.35	0.85	1.08	1.00	0.69	2.40	1.61	3.42	6.89	4.80
53	0.30	0.42	0.35	0.16	0.50	0.31	0.98	1.09	1.04	0.82	1.99	1.37	3.72	7.50	5.30
54	0.30	0.40	0.33	0.14	0.46	0.25	0.99	1.08	1.04	0.79	1.83	1.16	3.96	7.66	5.65
55	0.30	0.37	0.32	0.14	0.38	0.21	0.99	1.08	1.04	0.81	1.50	1.01	4.28	7.73	5.92
56	0.30	0.33	0.31	0.14	0.29	0.18	0.98	1.08	1.04	0.82	1.08	0.92	4.66	7.74	6.09
57	0.30	0.32	0.31	0.14	0.26	0.18	0.97	1.08	1.03	0.80	1.09	0.94	4.82	7.96	6.15
58	0.41	0.43	0.42	0.09	0.18	0.13	1.77	1.88	1.83	0.21	0.28	0.24	3.56	4.87	4.24
59	0.40	0.43	0.42	0.09	0.18	0.12	1.74	1.87	1.82	0.23	0.40	0.28	2.87	4.54	3.78
60	0.40	0.43	0.42	0.09	0.19	0.12	1.70	1.86	1.81	0.24	0.53	0.33	2.42	4.31	3.48
61	0.39	0.42	0.41	0.09	0.23	0.13	1.66	1.84	1.79	0.26	0.69	0.42	1.97	3.91	3.04
62	0.38	0.42	0.41	0.09	0.28	0.15	1.59	1.84	1.77	0.27	0.84	0.52	1.77	3.67	2.73
63	0.38	0.42	0.41	0.09	0.33	0.18	1.53	1.84	1.74	0.33	0.99	0.63	1.65	3.36	2.45
64	0.37	0.42	0.40	0.10	0.37	0.20	1.47	1.84	1.71	0.39	1.17	0.74	1.56	3.12	2.27
65	0.37	0.42	0.40	0.11	0.40	0.23	1.41	1.83	1.66	0.52	1.32	0.87	1.44	2.73	2.07
66	0.37	0.41	0.39	0.13	0.46	0.28	1.31	1.81	1.60	0.60	1.56	1.05	1.34	2.62	1.94
67	0.37	0.43	0.40	0.17	0.50	0.32	1.22	1.77	1.54	0.75	1.95	1.28	1.19	2.47	1.81
68	0.37	0.47	0.40	0.20	0.53	0.36	1.20	1.87	1.52	0.85	2.29	1.47	1.20	2.51	1.78
69	0.36	0.44	0.40	0.23	0.55	0.37	1.19	1.70	1.43	0.96	2.41	1.58	1.21	2.58	1.72
70	0.36	0.44	0.40	0.27	0.55	0.40	1.16	1.66	1.39	1.11	2.42	1.74	1.21	2.84	1.74
71	0.36	0.47	0.41	0.29	0.59	0.44	1.12	1.60	1.35	1.14	2.58	1.95	1.12	3.08	1.74
72	0.37	0.50	0.42	0.34	0.62	0.47	1.07	1.53	1.30	1.40	2.77	2.14	1.15	3.53	1.93
73	0.38	0.51	0.43	0.38	0.63	0.49	1.04	1.49	1.26	1.71	2.87	2.25	1.14	3.76	2.06
74	0.39	0.56	0.44	0.40	0.70	0.51	1.03	1.62	1.26	2.00	3.19	2.38	1.09	4.06	2.23
75	0.39	0.45	0.41	0.43	0.57	0.49	1.01	1.41	1.17	1.96	2.62	2.18	1.26	4.41	2.39
76	0.37	0.45	0.41	0.45	0.59	0.50	0.98	1.37	1.14	1.62	2.49	2.11	1.36	4.69	2.66
77	0.38	0.45	0.41	0.44	0.58	0.49	0.96	1.29	1.11	1.71	2.60	2.09	1.53	5.15	2.98
78	0.37	0.44	0.41	0.43	0.60	0.49	0.96	1.23	1.09	1.71	2.49	2.04	1.79	5.60	3.32
79	0.37	0.54	0.43	0.39	0.72	0.51	0.97	1.49	1.13	1.71	2.51	2.10	2.04	6.09	3.73
80	0.36	0.44	0.40	0.33	0.59	0.47	0.96	1.20	1.07	1.51	2.34	1.91	2.25	6.40	3.90
81	0.33	0.43	0.39	0.26	0.56	0.44	0.96	1.15	1.06	1.25	2.17	1.77	2.42	6.73	4.20
82	0.30	0.44	0.37	0.17	0.54	0.38	0.97	1.19	1.06	0.84	2.00	1.54	2.67	7.42	4.66
83	0.29	0.44	0.36	0.13	0.53	0.34	0.98	1.23	1.06	0.69	1.87	1.37	3.16	7.71	5.09
84	0.30	0.40	0.35	0.15	0.52	0.32	0.98	1.14	1.05	0.80	1.85	1.33	3.29	7.61	5.20
85	0.30	0.40	0.34	0.14	0.51	0.28	0.99	1.09	1.04	0.76	1.84	1.21	3.59	7.81	5.49
86	0.30	0.40	0.33	0.14	0.49	0.25	0.99	1.09	1.04	0.78	1.84	1.13	3.74	7.84	5.73
87	0.30	0.38	0.32	0.14	0.41	0.21	0.98	1.08	1.04	0.80	1.60	1.03	4.13	7.94	5.93
88	0.30	0.34	0.31	0.14	0.31	0.19	0.97	1.08	1.03	0.79	1.17	0.97	4.63	7.93	6.06
89	0.41	0.42	0.42	0.10	0.18	0.13	1.77	1.87	1.83	0.21	0.24	0.22	4.24	4.74	4.50
90	0.41	0.42	0.42	0.09	0.16	0.12	1.76	1.85	1.82	0.22	0.29	0.25	3.80	4.54	4.24
91	0.40	0.42	0.42	0.09	0.15	0.11	1.75	1.84	1.81	0.25	0.33	0.28	3.64	4.52	4.13
92	0.39	0.41	0.41	0.08	0.14	0.11	1.72	1.82	1.78	0.30	0.36	0.33	3.27	3.91	3.57
93	0.39	0.41	0.41	0.09	0.16	0.11	1.70	1.81	1.77	0.36	0.41	0.38	2.89	3.32	3.11
94	0.38	0.41	0.40	0.10	0.21	0.14	1.65	1.81	1.75	0.43	0.63	0.52	2.54	3.39	2.94
95	0.38	0.41	0.40	0.11	0.22	0.15	1.63	1.80	1.73	0.48	0.67	0.58	2.93	3.69	3.28
96	0.38	0.41	0.39	0.13	0.27	0.18	1.58	1.79	1.70	0.62	0.82	0.71	2.10	3.40	2.69
97	0.37	0.41	0.39	0.14	0.41	0.25	1.41	1.81	1.64	0.65	1.32	0.94	1.49	2.74	2.07
98	0.36	0.41	0.39	0.18	0.45	0.30	1.31	1.75	1.55	0.80	1.52	1.13	1.37	2.48	1.87
99	0.31	0.41	0.38	0.21	0.50	0.34	1.16	1.73	1.45	0.88	1.88	1.30	1.27	2.37	1.71
100	0.38	0.41	0.39	0.33	0.49	0.40	1.30	1.58	1.44	1.33	1.66	1.49	1.49	2.52	1.93
101	0.37	0.41	0.39	0.37	0.50	0.42	1.24	1.49	1.37	1.58	1.78	1.66	1.62	2.82	2.12
102	0.38	0.41	0.40	0.38	0.51	0.43	1.15	1.46	1.31	1.63	1.85	1.75	1.63	2.90	2.12
103	0.39	0.43	0.41	0.42	0.55	0.47	1.07	1.37	1.21	1.94	2.12	2.04	1.61	3.29	2.20
104	0.40	0.45	0.43	0.44	0.59	0.50	1.03	1.38	1.17	2.08	2.34	2.22	1.48	4.06	2.39
105	0.39	0.46	0.43	0.44	0.61	0.51	1.06	1.30	1.16	2.00	2.46	2.25	1.67	4.29	2.65
106	0.42	0.48	0.45	0.48	0.62	0.54	1.06	1.24	1.14	2.34	2.64	2.49	1.96	4.87	3.00
107	0.40	0.47	0.43	0.50	0.62	0.54	1.05	1.24	1.15	1.71	2.48	2.11	2.35	5.46	3.52
108	0.39	0.46	0.42	0.46	0.63	0.52	1.02	1.28	1.13	1.70	2.40	2.02	2.36	5.72	3.82
109	0.35	0.43	0.39	0.44	0.58	0.49	0.94	1.17	1.05	1.35	2.11	1.66	2.92	5.75	4.25

110	0.37	0.40	0.39	0.46	0.58	0.51	0.98	1.11	1.04	1.46	1.60	1.55	3.96	5.81	4.65
111	0.31	0.39	0.36	0.33	0.54	0.43	0.93	1.12	1.02	1.15	1.65	1.42	3.50	5.71	4.29
112	0.29	0.39	0.34	0.23	0.53	0.37	0.85	1.10	1.00	0.90	1.73	1.31	3.04	6.69	4.48
113	0.27	0.39	0.34	0.20	0.52	0.34	0.80	1.08	1.01	0.96	1.65	1.26	3.39	7.43	4.96
114	0.32	0.35	0.34	0.25	0.41	0.32	0.98	1.08	1.04	0.99	1.31	1.14	4.36	7.21	5.66
115	0.30	0.35	0.33	0.21	0.38	0.28	0.99	1.07	1.04	0.90	1.24	1.07	4.72	7.34	5.92
116	0.29	0.35	0.31	0.16	0.36	0.22	0.99	1.08	1.04	0.74	1.27	0.90	4.64	7.83	6.23
117	0.29	0.31	0.30	0.14	0.25	0.18	1.00	1.08	1.05	0.76	0.84	0.79	5.19	7.92	6.53
118	0.30	0.32	0.31	0.14	0.26	0.18	0.99	1.07	1.04	0.81	0.91	0.86	5.01	8.26	6.51
119	0.29	0.30	0.30	0.13	0.21	0.16	1.00	1.07	1.04	0.76	0.80	0.78	5.46	9.34	7.26
120	0.30	0.32	0.31	0.14	0.24	0.18	0.95	1.08	1.02	0.78	1.14	0.96	4.87	7.97	6.18
121	0.30	0.31	0.31	0.14	0.25	0.18	0.93	1.06	1.00	0.84	1.20	1.02	4.86	8.12	6.11
122	0.30	0.31	0.31	0.15	0.28	0.20	0.91	1.03	0.98	1.00	1.38	1.18	4.88	7.90	5.93
123	0.30	0.32	0.31	0.16	0.31	0.23	0.87	1.02	0.95	1.10	1.60	1.35	4.87	7.50	5.80
124	0.30	0.32	0.31	0.18	0.33	0.25	0.83	1.00	0.92	1.21	1.72	1.49	4.87	7.09	5.80
125	0.30	0.31	0.30	0.21	0.35	0.28	0.78	0.95	0.87	1.42	1.86	1.65	5.07	6.63	5.79
126	0.30	0.31	0.30	0.24	0.38	0.32	0.75	0.91	0.83	1.57	2.05	1.82	5.28	6.51	5.96
127	0.30	0.31	0.31	0.26	0.39	0.34	0.74	0.89	0.80	1.68	2.21	1.97	5.41	6.73	6.13
128	0.30	0.30	0.30	0.28	0.36	0.32	0.77	0.86	0.81	1.80	2.02	1.91	5.58	6.68	6.13
129	0.30	0.31	0.31	0.31	0.40	0.36	0.73	0.83	0.77	1.87	2.29	2.09	5.65	6.88	6.34
130	0.30	0.31	0.31	0.34	0.40	0.37	0.73	0.79	0.75	2.02	2.50	2.28	5.87	7.11	6.57
131	0.31	0.31	0.31	0.36	0.40	0.38	0.73	0.77	0.75	2.22	2.66	2.45	6.07	7.31	6.76
132	0.30	0.31	0.31	0.34	0.39	0.36	0.73	0.76	0.75	2.39	2.81	2.61	6.27	7.53	6.97
133	0.30	0.31	0.31	0.34	0.38	0.36	0.73	0.76	0.75	2.57	3.00	2.80	6.46	7.77	7.19
134	0.31	0.31	0.31	0.34	0.38	0.35	0.74	0.76	0.75	2.82	3.23	3.03	6.74	8.02	7.43
135	0.29	0.30	0.29	0.32	0.35	0.33	0.72	0.74	0.73	2.64	2.69	2.67	6.66	7.68	7.25
136	0.30	0.31	0.31	0.32	0.35	0.33	0.73	0.75	0.73	3.06	3.46	3.27	6.96	8.30	7.67
137	0.30	0.31	0.31	0.31	0.34	0.32	0.72	0.74	0.73	3.29	3.64	3.48	7.18	8.55	7.89
138	0.30	0.30	0.30	0.26	0.29	0.27	0.71	0.72	0.72	3.51	3.73	3.63	7.40	8.76	8.09
139	0.30	0.31	0.30	0.27	0.28	0.27	0.72	0.73	0.72	3.79	3.91	3.86	7.58	9.01	8.31
140	0.31	0.31	0.31	0.26	0.29	0.27	0.72	0.73	0.73	4.09	4.15	4.12	7.99	9.34	8.69
141	0.28	0.29	0.28	0.05	0.07	0.06	0.73	0.73	0.73	3.66	3.70	3.68	8.21	9.39	8.83
142	0.45	0.80	0.61	0.15	0.41	0.26	1.88	2.76	2.29	0.45	3.54	1.92	4.21	5.65	4.81
143	0.59	0.73	0.67	0.26	0.50	0.37	2.20	2.52	2.37	1.42	1.97	1.59	4.56	5.30	4.93
144	0.72	0.91	0.82	0.42	0.65	0.52	2.47	2.85	2.67	1.79	2.34	2.05	5.00	5.83	5.39
145	1.07	1.21	1.13	0.65	0.82	0.72	3.46	3.36	3.22	3.17	3.68	3.39	5.84	6.55	6.17
146	2.36	3.37	2.78	0.57	0.82	0.67	6.89	9.59	8.01	25.11	38.44	30.50	12.94	18.79	15.28
147	0.58	0.72	0.64	1.71	2.70	2.09	1.83	2.21	2.02	3.80	5.46	4.44	2.91	3.93	3.41
148	0.18	0.31	0.25	0.10	0.30	0.20	1.30	1.39	1.35	1.58	1.85	1.73	2.94	4.45	3.70
149	0.13	0.16	0.14	0.03	0.07	0.05	1.37	1.39	1.38	1.65	1.73	1.68	4.24	4.70	4.49
150	0.10	0.10	0.10	0.02	0.03	0.02	1.43	1.44	1.43	2.23	2.29	2.25	4.94	5.22	5.06
151	0.67	0.95	0.77	1.15	1.82	1.39	1.14	1.40	1.25	3.64	5.46	4.30	4.96	6.38	5.51
152	0.41	0.46	0.43	0.46	0.61	0.51	1.12	1.27	1.20	1.30	1.40	1.33	5.16	6.70	5.62
153	0.61	0.73	0.66	0.28	0.39	0.32	1.38	1.59	1.48	1.94	2.29	2.09	6.50	8.56	7.34
154	0.98	1.25	1.10	0.44	0.59	0.50	2.63	3.36	2.95	2.18	2.43	2.29	8.47	10.52	9.37
155	0.81	1.17	0.96	2.03	3.32	2.56	1.36	1.88	1.58	5.22	6.47	5.72	8.04	9.23	8.60
156	0.43	0.46	0.44	0.54	0.63	0.57	1.06	1.22	1.14	1.13	1.35	1.26	2.31	3.48	2.63

STATISTICAL ANALYSIS OF CONSTITUENT 1 CONCENTRATIONS FROM CYCLE 750 TO CYCLE 1450

JUNC	MEAN	ST DEV	SKEWNESS	KURTOSIS	CUMULATIVE PROBABILITIES 00	10	20	30	40	50	60	70	80	90	100
12	0.30	0.02	0.32	-1.37	0.28	0.28	0.28	0.28	0.29	0.29	0.30	0.31	0.32	0.32	0.33
24	0.41	0.02	-0.42	-1.30	0.38	0.38	0.39	0.40	0.41	0.42	0.42	0.43	0.43	0.43	0.43
25	0.42	0.01	-0.70	-0.82	0.40	0.40	0.41	0.42	0.42	0.42	0.42	0.43	0.43	0.43	0.43
61	0.41	0.01	-1.12	0.67	0.39	0.40	0.41	0.41	0.41	0.42	0.42	0.42	0.42	0.42	0.42
48	0.39	0.02	-0.98	0.34	0.34	0.36	0.38	0.39	0.39	0.40	0.40	0.40	0.41	0.41	0.42
109	0.39	0.02	0.18	-1.16	0.35	0.36	0.36	0.37	0.38	0.38	0.39	0.40	0.41	0.42	0.43
79	0.43	0.04	1.20	0.37	0.37	0.39	0.40	0.40	0.41	0.42	0.42	0.43	0.45	0.51	0.53
126	0.30	0.00	-0.29	-0.78	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.31	0.31	0.31	0.31

STATISTICAL ANALYSIS OF CONSTITUENT 2 CONCENTRATIONS FROM CYCLE 750 TO CYCLE 1450

JUNC	MEAN	ST DEV	SKEWNESS	KURTOSIS	CUMULATIVE PROBABILITIES 00	10	20	30	40	50	60	70	80	90	100
12	0.11	0.01	0.49	-0.96	0.09	0.09	0.09	0.10	0.10	0.10	0.11	0.12	0.12	0.13	0.14
24	0.15	0.02	0.47	-1.32	0.12	0.13	0.13	0.13	0.14	0.14	0.15	0.17	0.17	0.18	0.19
25	0.14	0.02	0.35	-1.19	0.11	0.12	0.13	0.13	0.13	0.13	0.15	0.16	0.17	0.18	0.18
61	0.13	0.03	0.83	0.11	0.09	0.09	0.10	0.10	0.12	0.13	0.14	0.15	0.15	0.18	0.23
48	0.47	0.04	0.43	-0.46	0.40	0.42	0.43	0.44	0.45	0.47	0.48	0.48	0.49	0.51	0.56
109	0.49	0.03	0.52	-0.47	0.44	0.45	0.46	0.47	0.48	0.49	0.49	0.50	0.52	0.54	0.57
79	0.51	0.07	0.73	0.17	0.39	0.42	0.45	0.47	0.48	0.49	0.51	0.54	0.56	0.61	0.72
126	0.32	0.04	-0.26	-0.87	0.24	0.25	0.28	0.30	0.31	0.32	0.33	0.34	0.35	0.37	0.38

STATISTICAL ANALYSIS OF CONSTITUENT 3 CONCENTRATIONS FROM CYCLE 750 TO CYCLE 1450

JUNC	MEAN	ST DEV	SKEWNESS	KURTOSIS	CUMULATIVE PROBABILITIES 00	10	20	30	40	50	60	70	80	90	100
12	1.54	0.04	0.21	-0.81	1.45	1.48	1.50	1.51	1.52	1.53	1.55	1.56	1.58	1.60	1.62
24	1.83	0.05	-0.54	-0.91	1.72	1.75	1.77	1.81	1.83	1.84	1.85	1.87	1.88	1.89	1.90
25	1.84	0.02	-0.23	-0.76	1.78	1.80	1.82	1.82	1.83	1.84	1.85	1.85	1.86	1.87	1.89
61	1.79	0.05	-1.02	0.33	1.66	1.72	1.76	1.78	1.79	1.80	1.81	1.83	1.83	1.84	1.84
48	1.03	0.06	-0.41	-0.21	0.86	0.95	0.98	1.01	1.03	1.04	1.05	1.07	1.08	1.11	1.16
109	1.05	0.05	0.02	-0.69	0.94	0.98	1.01	1.03	1.04	1.05	1.07	1.09	1.10	1.13	1.17
79	1.13	0.12	1.21	0.65	0.97	1.02	1.05	1.07	1.08	1.09	1.13	1.15	1.20	1.33	1.48
126	0.83	0.04	0.32	-0.90	0.75	0.77	0.79	0.80	0.81	0.82	0.83	0.85	0.87	0.90	0.91

********** STATISTICAL ANALYSIS OF CONSTITUENT 4 CONCENTRATIONS FROM CYCLE 750 TO CYCLE 1450 **********

JUNC	MEAN	ST DEV	SKEWNESS	KURTOSIS	CUMULATIVE PROBABILITIES										
					00	10	20	30	40	50	60	70	80	90	100
12	0.06	0.02	-0.22	-0.83	0.01	0.03	0.04	0.05	0.06	0.06	0.07	0.08	0.08	0.09	0.12
24	0.21	0.04	-0.16	-1.46	0.14	0.15	0.16	0.18	0.20	0.22	0.24	0.25	0.26	0.27	0.28
25	0.24	0.03	-0.35	-1.21	0.18	0.19	0.20	0.22	0.24	0.25	0.26	0.27	0.28	0.28	0.29
61	0.42	0.15	0.50	-1.25	0.26	0.26	0.27	0.30	0.33	0.38	0.44	0.53	0.58	0.66	0.69
48	1.88	0.18	0.49	-0.93	1.60	1.68	1.72	1.77	1.80	1.83	1.87	1.92	2.09	2.18	2.20
109	1.66	0.25	0.52	-1.05	1.35	1.37	1.40	1.47	1.51	1.59	1.65	1.80	1.93	2.05	2.11
79	2.10	0.27	-0.10	-1.54	1.71	1.75	1.76	1.86	1.91	2.17	2.26	2.31	2.38	2.42	2.51
126	1.82	0.16	-0.09	-1.35	1.57	1.59	1.63	1.71	1.75	1.83	1.87	1.93	1.99	2.04	2.05

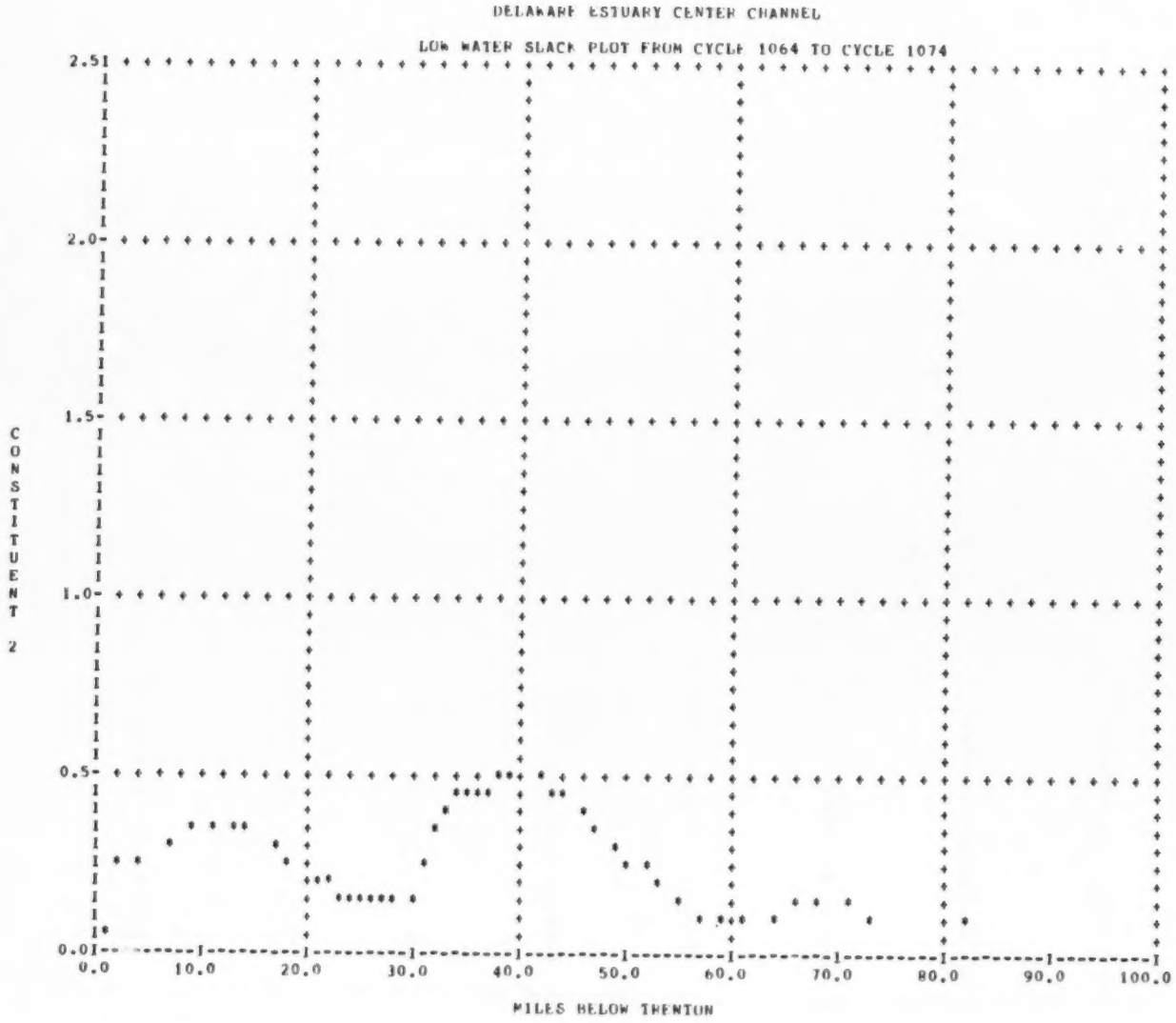
********** STATISTICAL ANALYSIS OF CONSTITUENT 5 CONCENTRATIONS FROM CYCLE 750 TO CYCLE 1450 **********

JUNC	MEAN	ST DEV	SKEWNESS	KURTOSIS	CUMULATIVE PROBABILITIES										
					00	10	20	30	40	50	60	70	80	90	100
12	6.13	0.33	0.57	-1.01	5.66	5.76	5.83	5.88	5.94	6.02	6.13	6.32	6.50	6.65	6.84
24	4.86	0.33	-0.12	-1.28	4.27	4.39	4.50	4.64	4.75	4.88	5.00	5.12	5.21	5.29	5.42
25	4.58	0.36	-0.15	-1.30	3.93	4.07	4.18	4.31	4.47	4.61	4.74	4.85	4.95	5.03	5.16
61	3.04	0.60	-0.14	-1.36	1.97	2.20	2.40	2.58	2.82	3.08	3.32	3.55	3.70	3.81	3.91
48	3.59	0.84	0.60	-0.31	2.35	2.56	2.74	3.01	3.29	3.55	3.75	3.94	4.20	4.81	5.79
109	4.25	0.64	0.14	-0.56	2.92	3.35	3.71	3.96	4.09	4.17	4.34	4.52	4.84	5.19	5.75
79	3.73	1.01	0.29	-0.64	2.04	2.34	2.73	3.07	3.50	3.79	3.95	4.14	4.54	5.25	6.04
126	5.96	0.28	-0.13	-0.77	5.28	5.56	5.70	5.80	5.88	5.96	6.04	6.13	6.23	6.35	6.50

END OF QUALITY RUN. 1450 CYCLES.

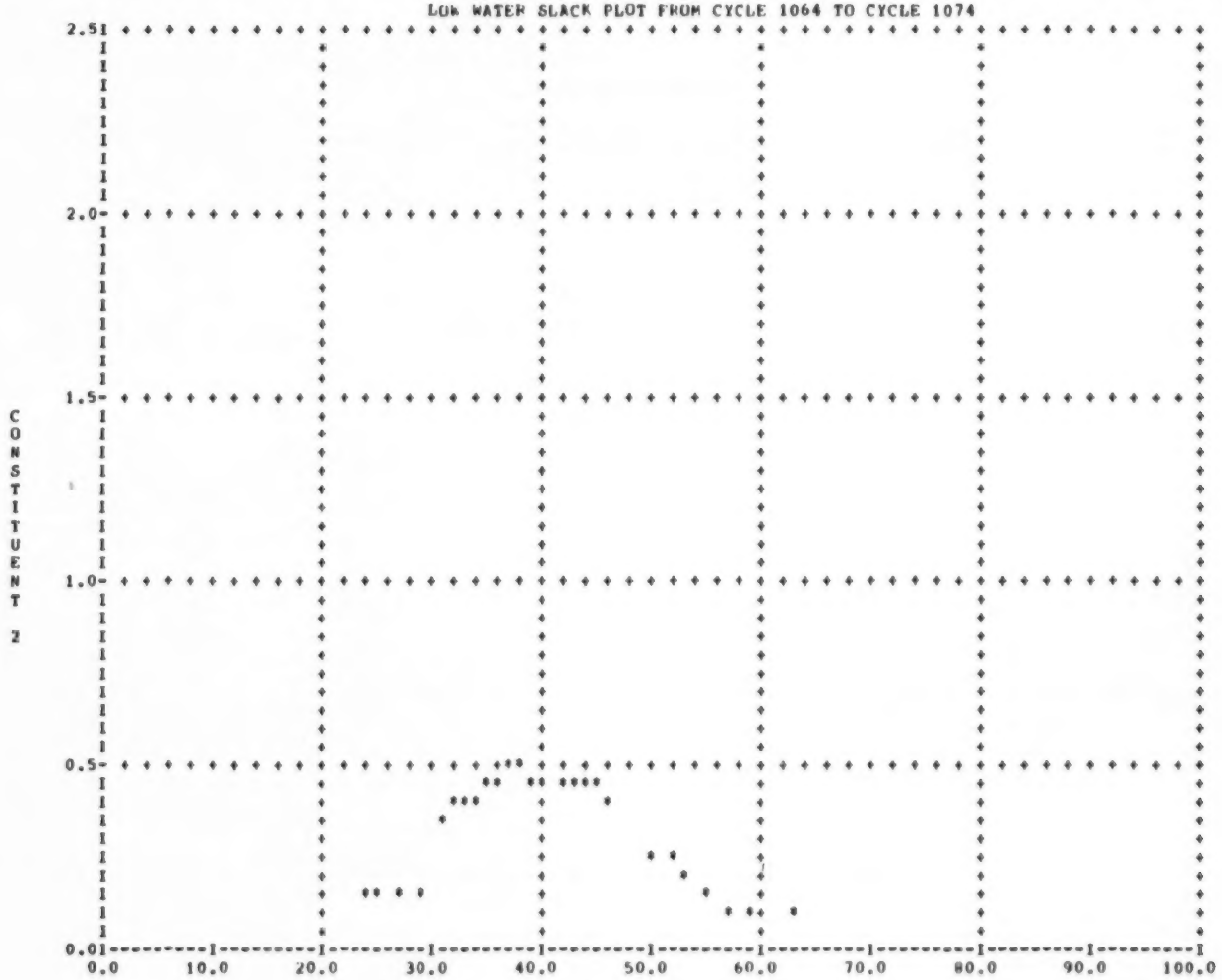
THE FOLLOWING DEPLETION CORRECTIONS (MG/L * CU FT) WERE ACCUMULATED FOR CONSTITUENT 4

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
181532.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.


DELAWARE ESTUARY CENTER CHANNEL
LOW WATER SLACK PLOT FROM CYCLE 1064 TO CYCLE 1074
CONSTITUENT 2
2.5
2.0
1.5
1.0
0.5
0.0
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
MILES BELOW TRENTON

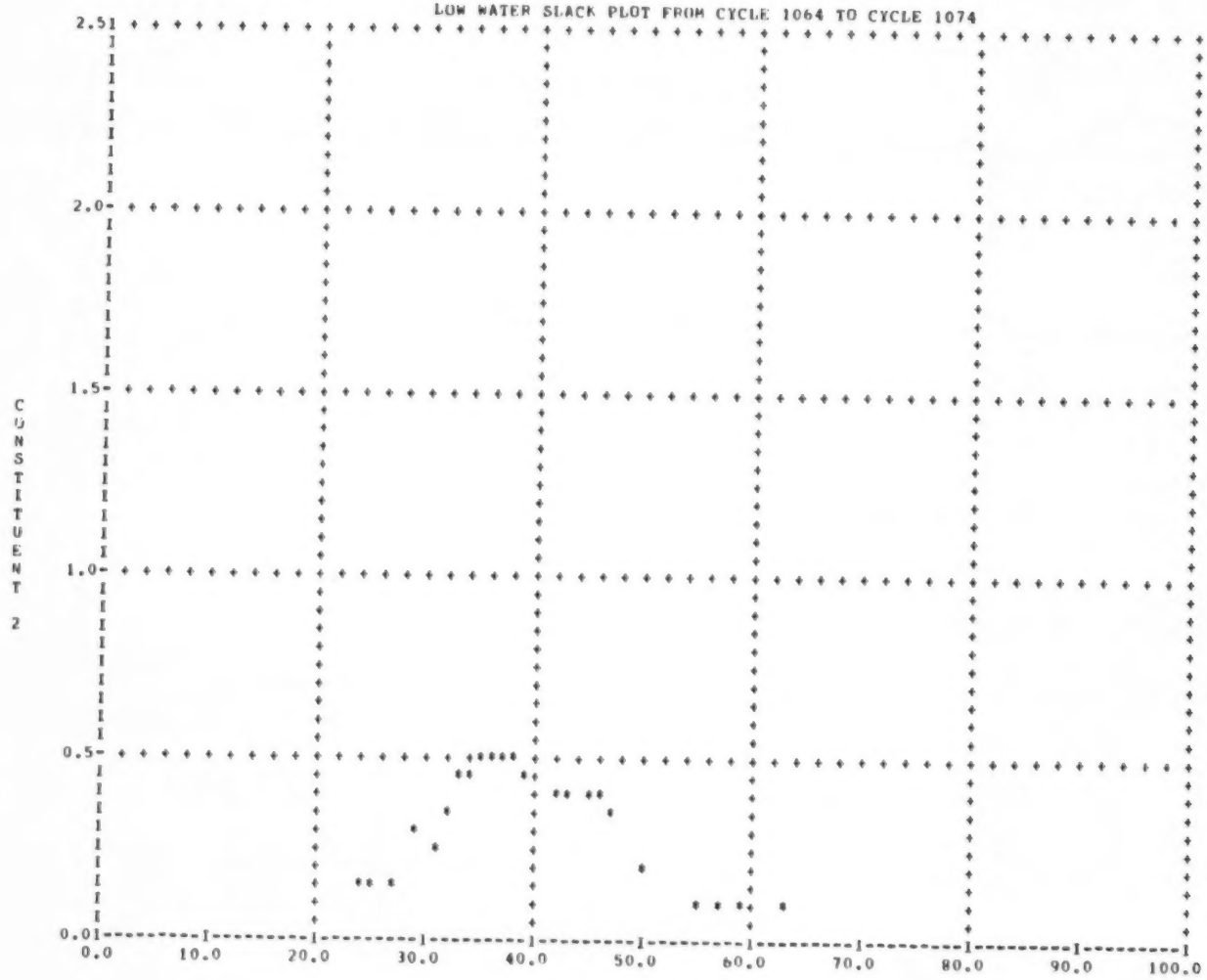
DELAWARE ESTUARY PA-DEL SIDE

LOW WATER SLACK PLOT FROM CYCLE 1064 TO CYCLE 1074



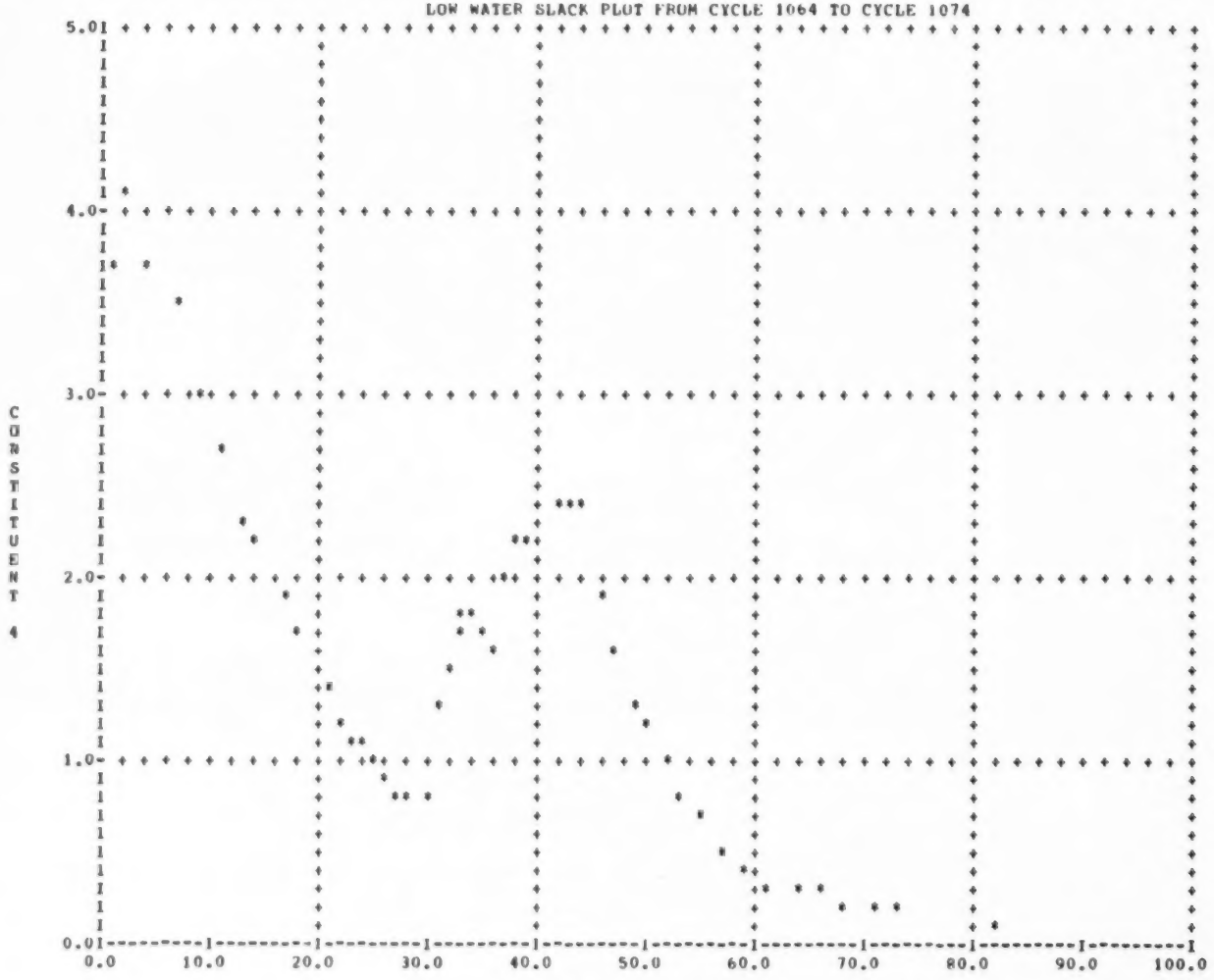
DELAWARE ESTUARY NJ SIDE

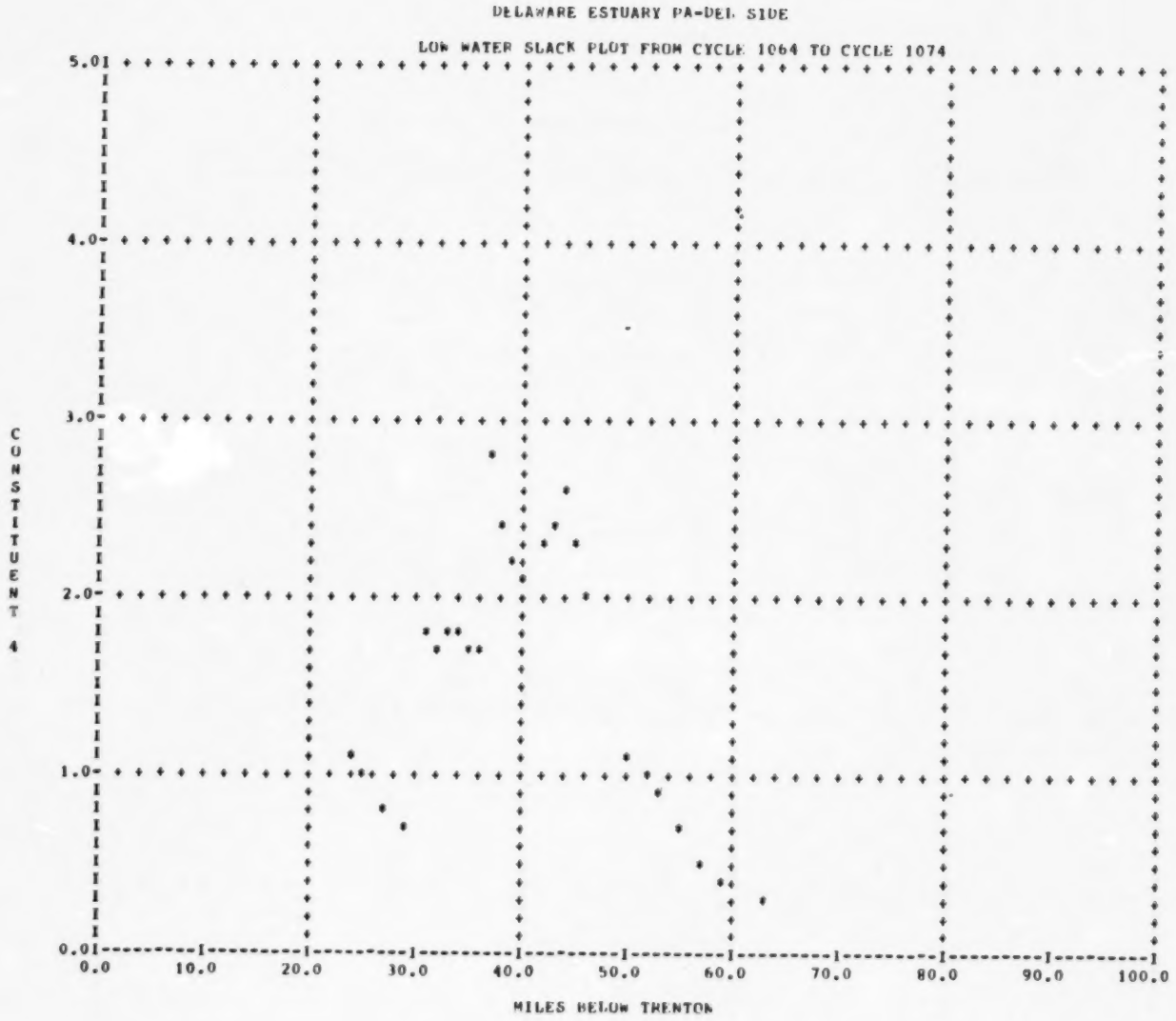
LOW WATER SLACK PLOT FROM CYCLE 1064 TO CYCLE 1074



DELAWARE ESTUARY CENTER CHANNEL

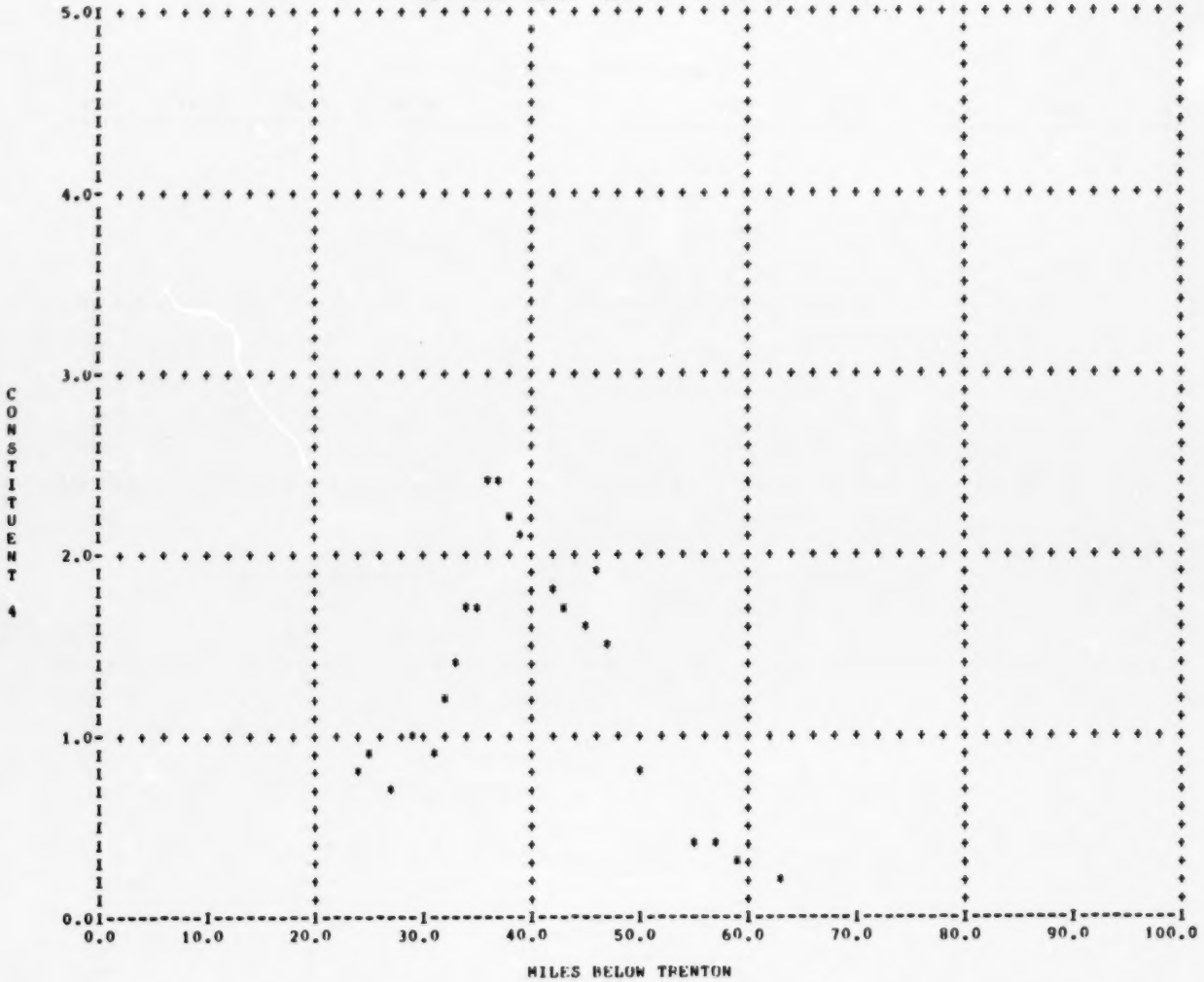
LOW WATER SLACK PLOT FROM CYCLE 1064 TO CYCLE 1074




DELAWARE ESTUARY PA-DEL SIDE
LOW WATER SLACK PLOT FROM CYCLE 1064 TO CYCLE 1074
CONSTITUENT 4
5.0
4.0
3.0
2.0
1.0
0.0
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
MILES BELOW TRENTON

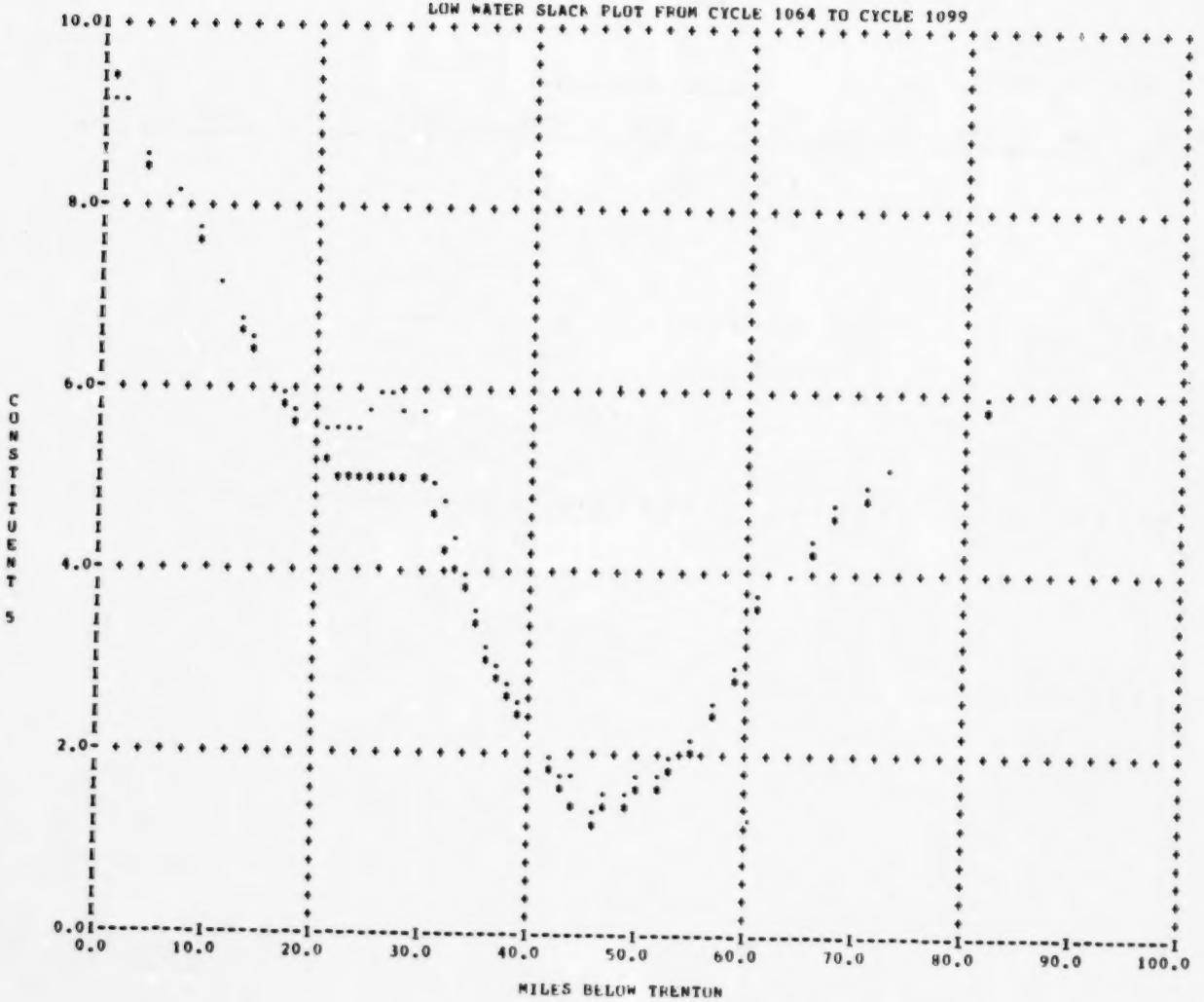
DELAWARE ESTUARY NJ SIDE

LOW WATER SLACK PLOT FROM CYCLE 1064 TO CYCLE 1074



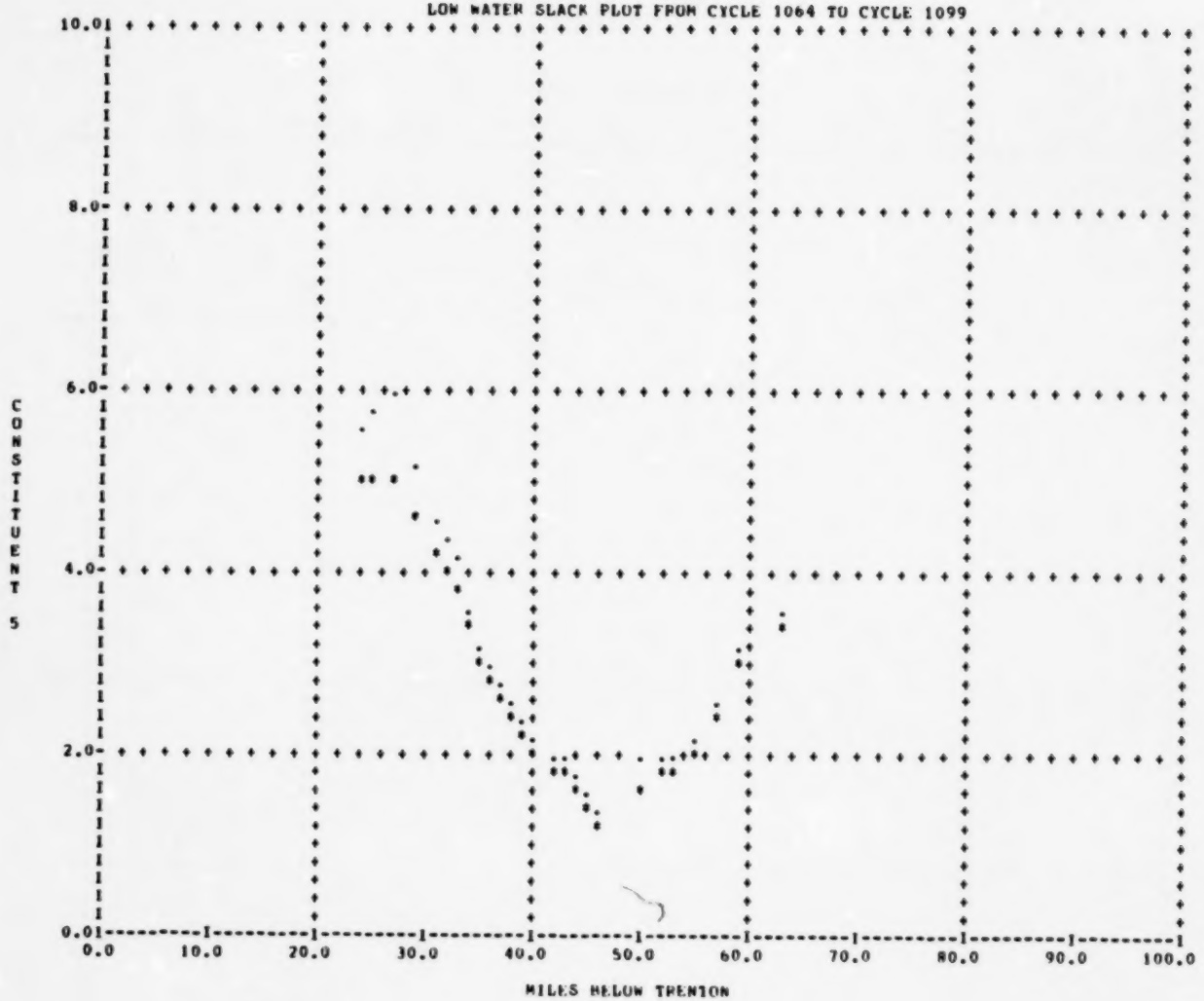
DELAWARE ESTUARY CENTER CHANNEL

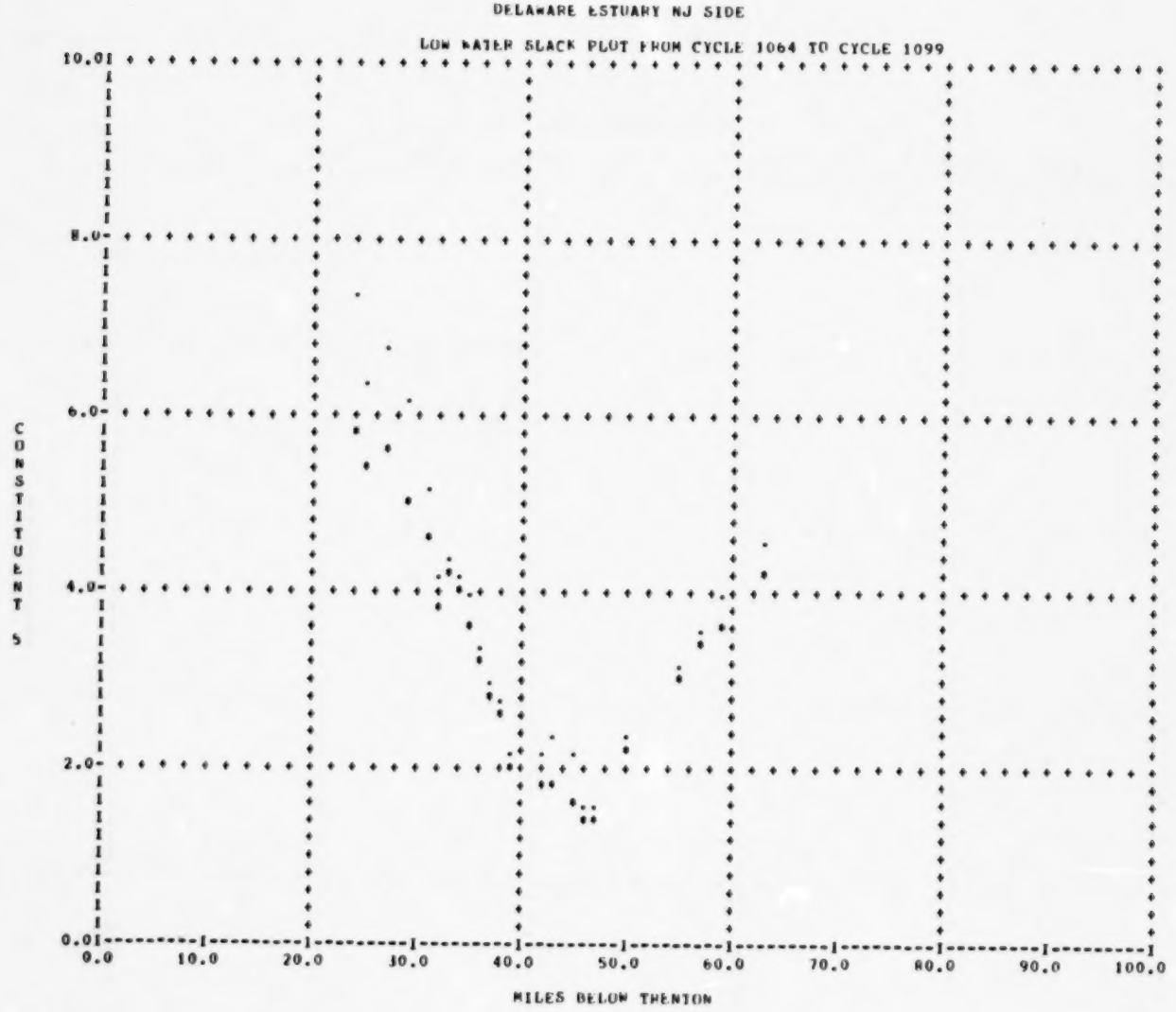
LOW WATER SLACK PLOT FROM CYCLE 1064 TO CYCLE 1099



DELAWARE ESTUARY PA-DEL SIDE

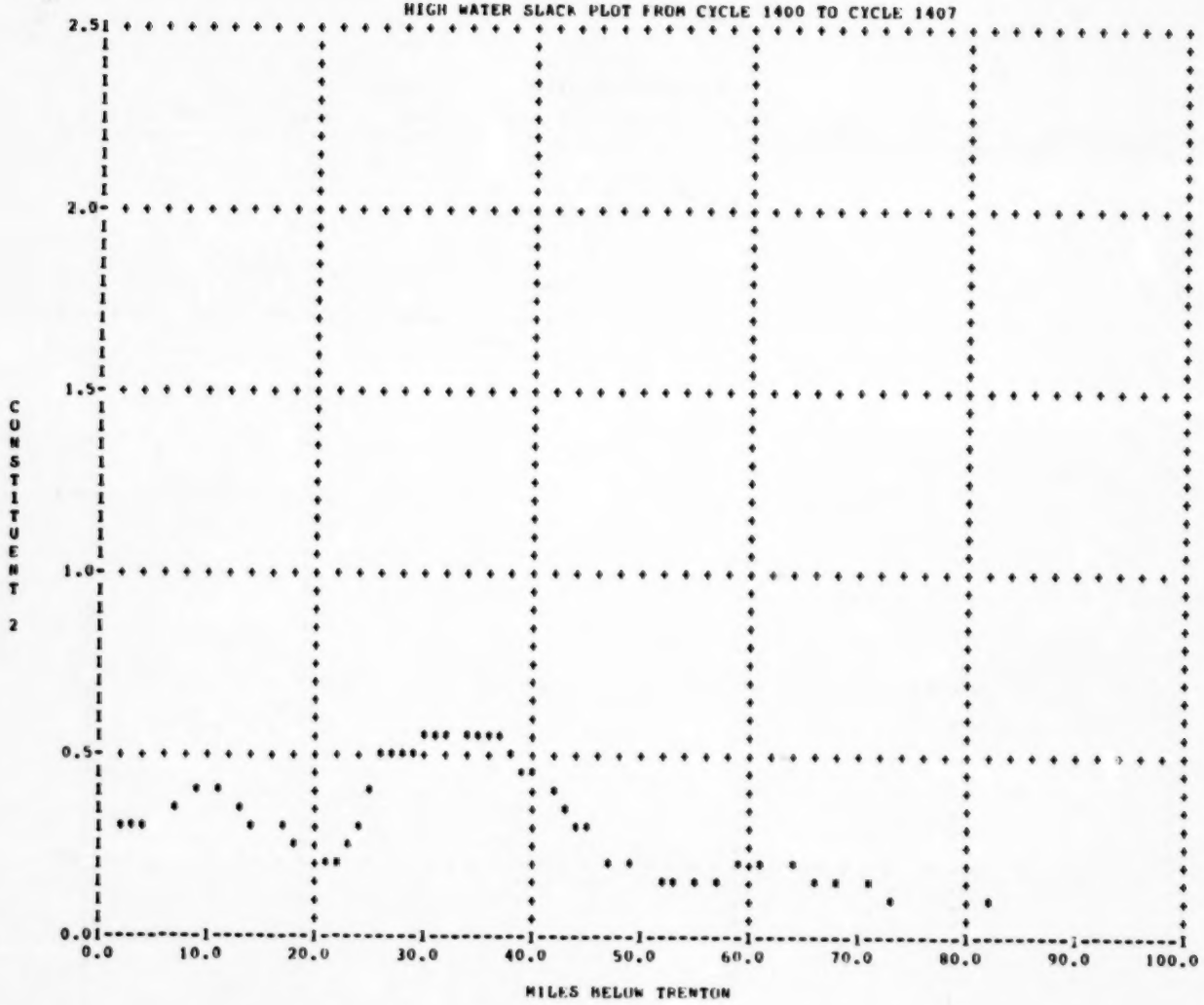
LOW WATER SLACK PLOT FROM CYCLE 1064 TO CYCLE 1099




DELAWARE ESTUARY NJ SIDE
LOW WATER SLACK PLOT FROM CYCLE 1064 TO CYCLE 1099
10.0
8.0
6.0
4.0
2.0
0.0
CONSTITUENTS
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
MILES BELOW TRENTON

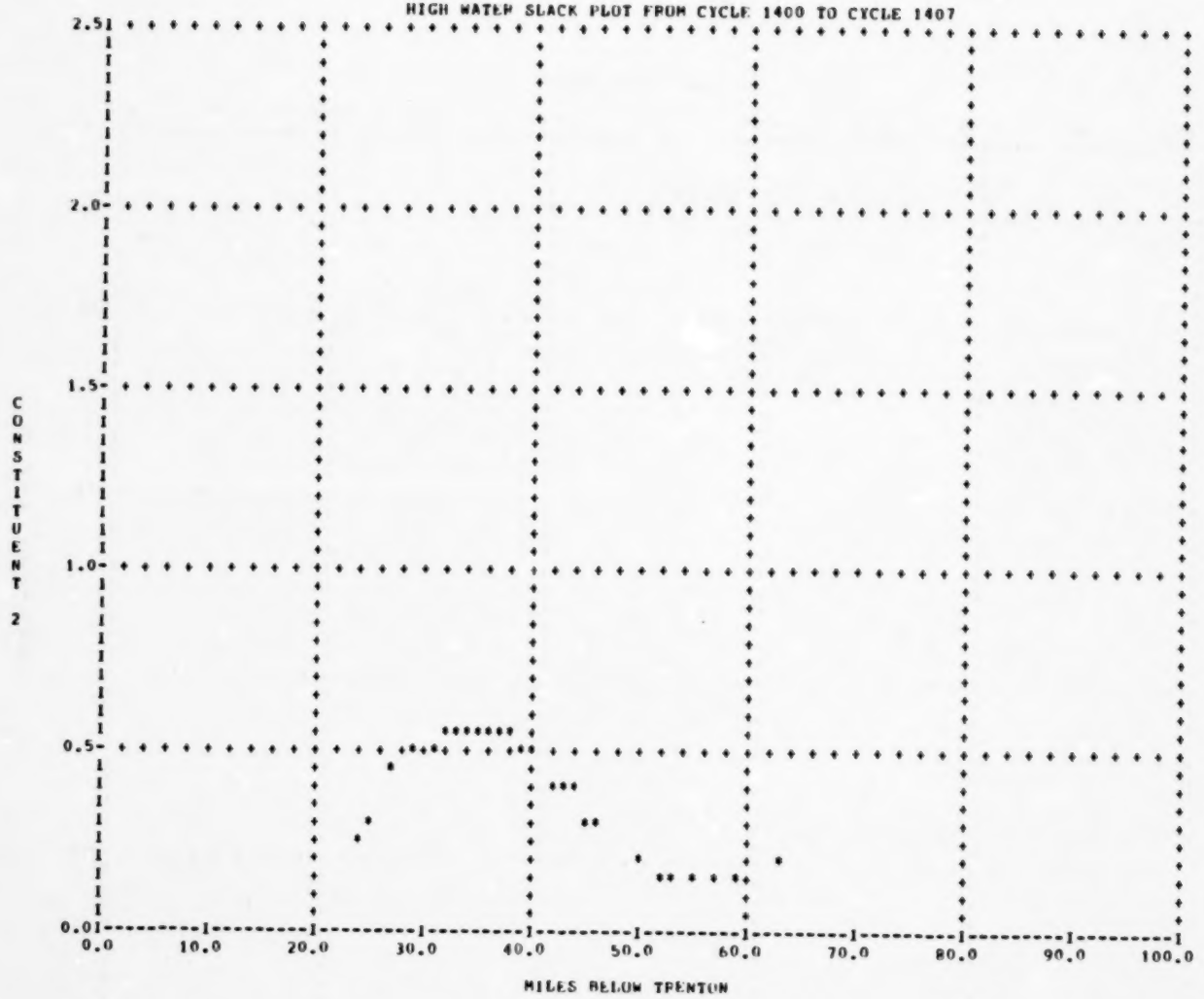
DELAWARE ESTUARY CENTER CHANNEL

HIGH WATER SLACK PLOT FROM CYCLE 1400 TO CYCLE 1407



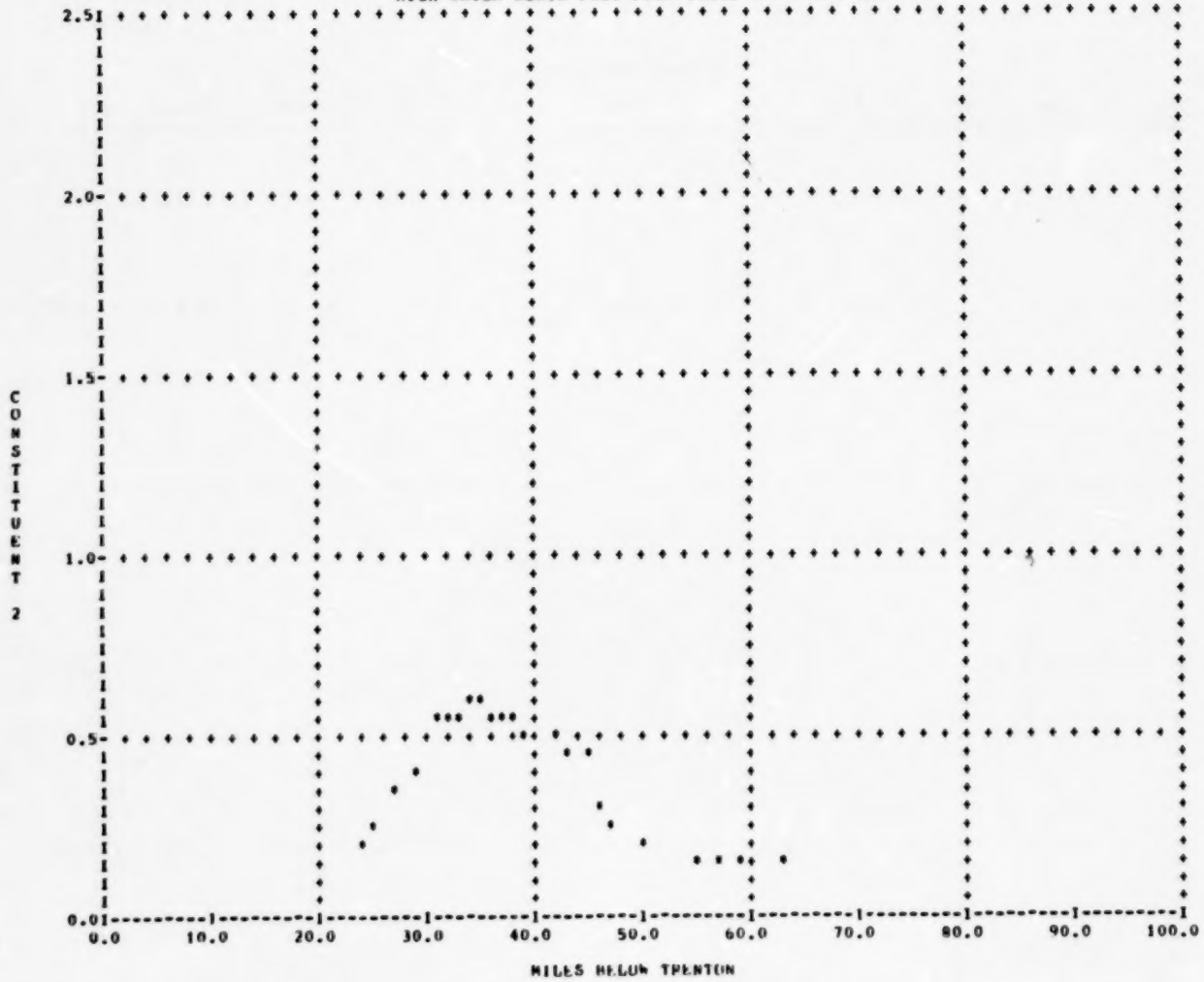
DELAWARE ESTUARY PA-DEL SIDE

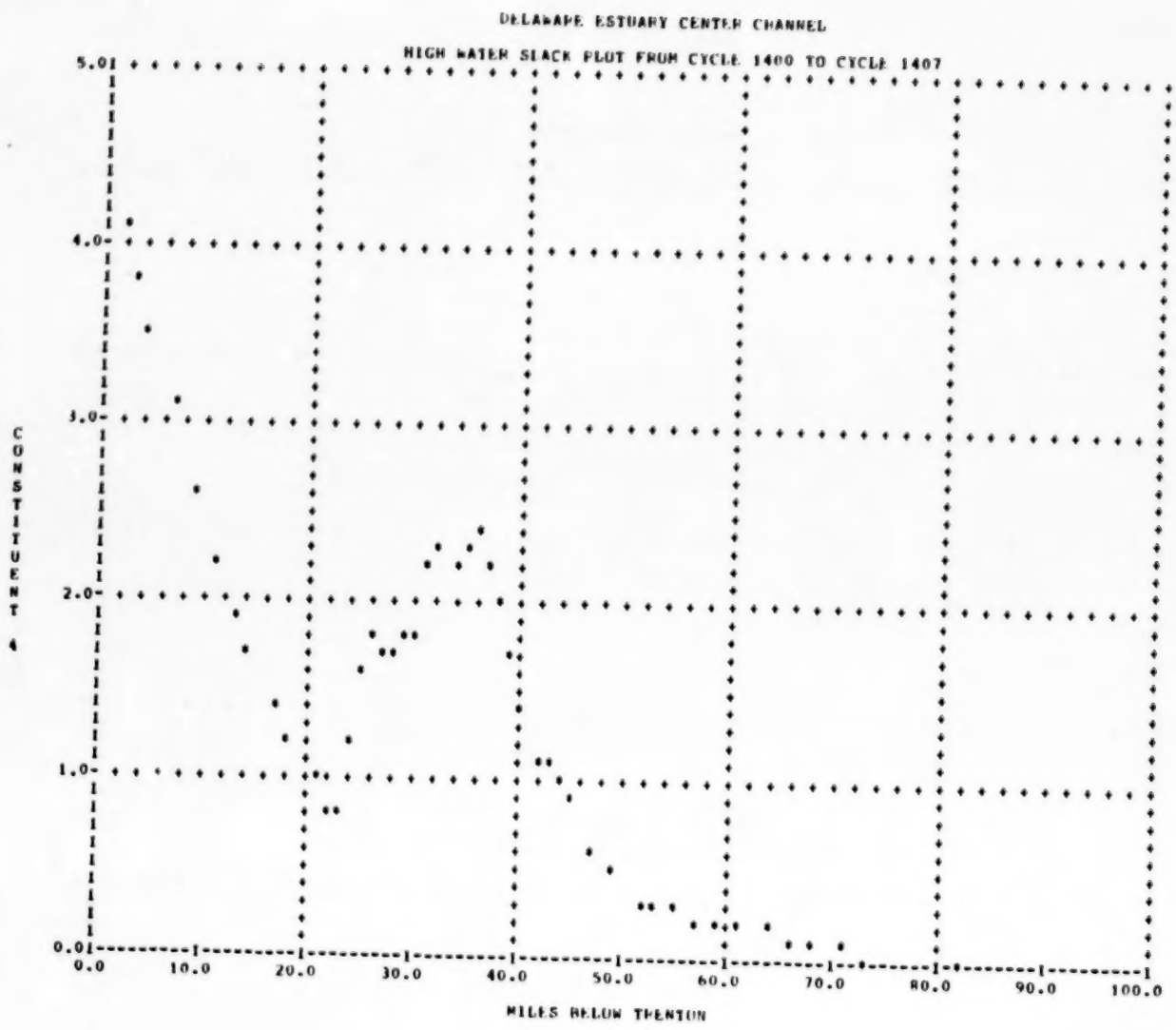
HIGH WATER SLACK PLOT FROM CYCLE 1400 TO CYCLE 1407



DELAWARE ESTUARY NJ SIDE

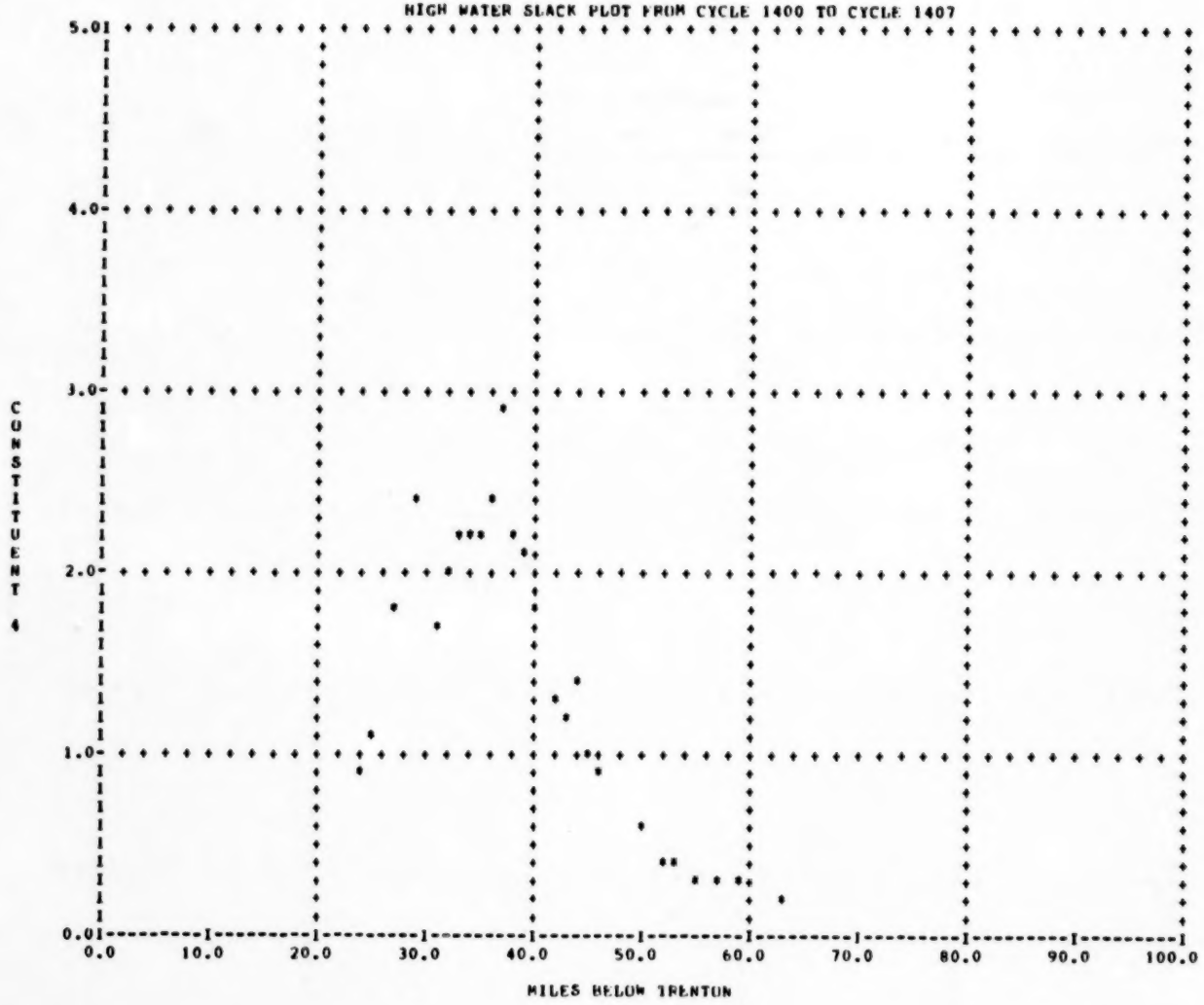
HIGH WATER SLACK PLOT FROM CYCLE 1400 TO CYCLE 1407




DELAWARE ESTUARY CENTER CHANNEL
HIGH WATER SLACK PLOT FROM CYCLE 1400 TO CYCLE 1407
CONSTITUENT 4
5.0
4.0
3.0
2.0
1.0
0.0
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
MILES BELOW TRENTON

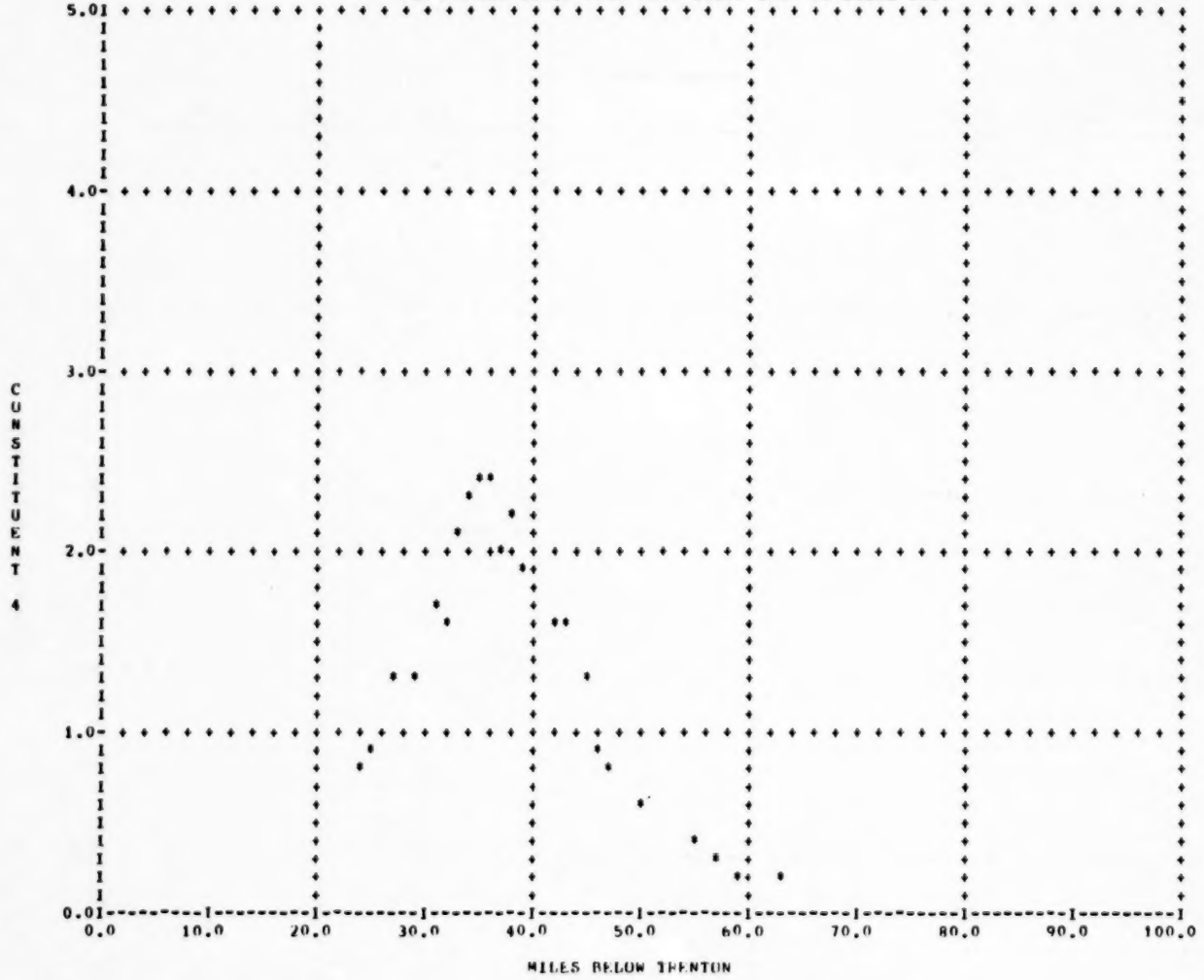
DELAWARE ESTUARY PA-DEL SIDE

HIGH WATER SLACK PLOT FROM CYCLE 1400 TO CYCLE 1407



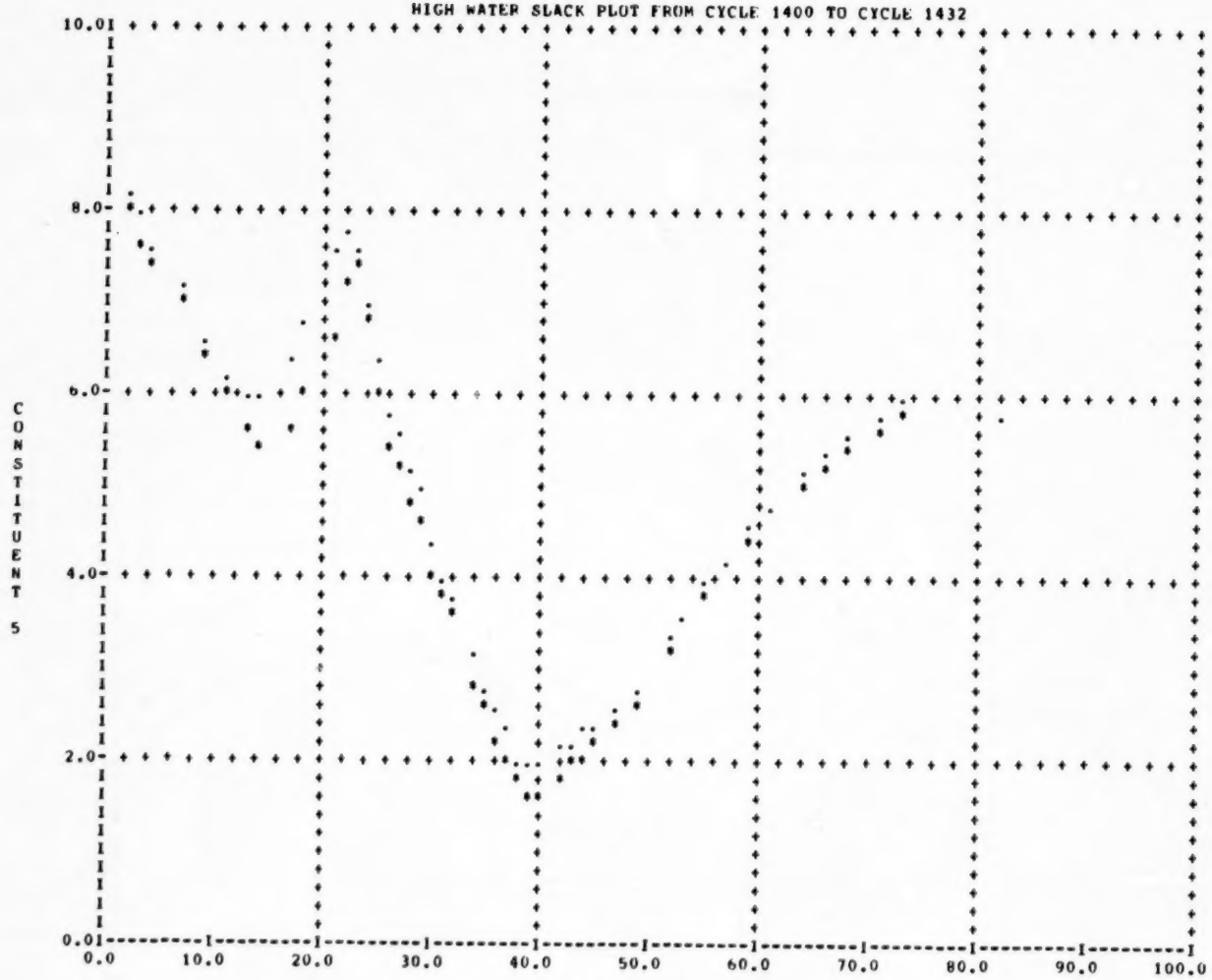
DELAWARE ESTUARY NJ SIDE

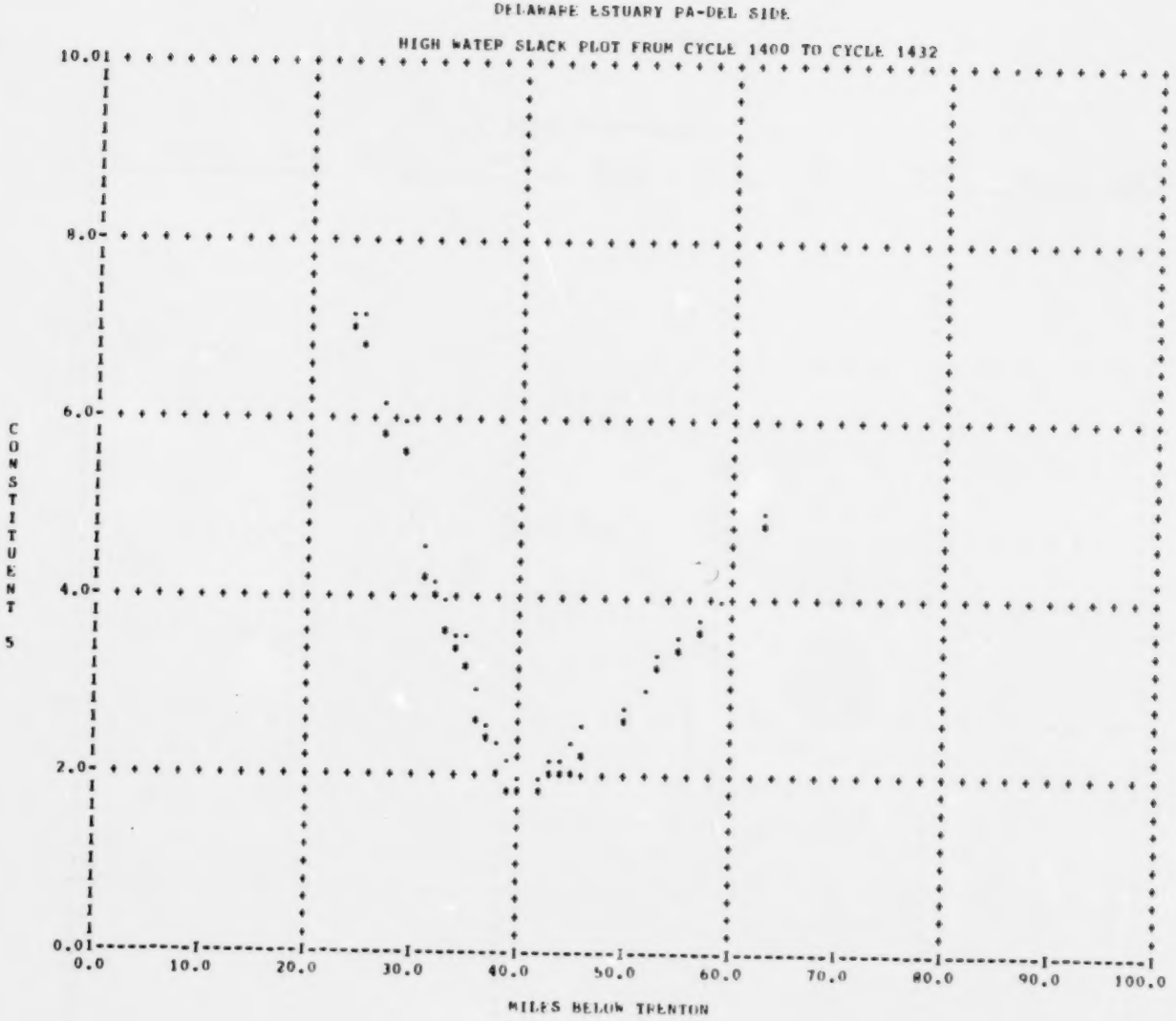
HIGH WATER SLACK PLOT FROM CYCLE 1400 TO CYCLE 1407



DELAWARE ESTUARY CENTER CHANNEL

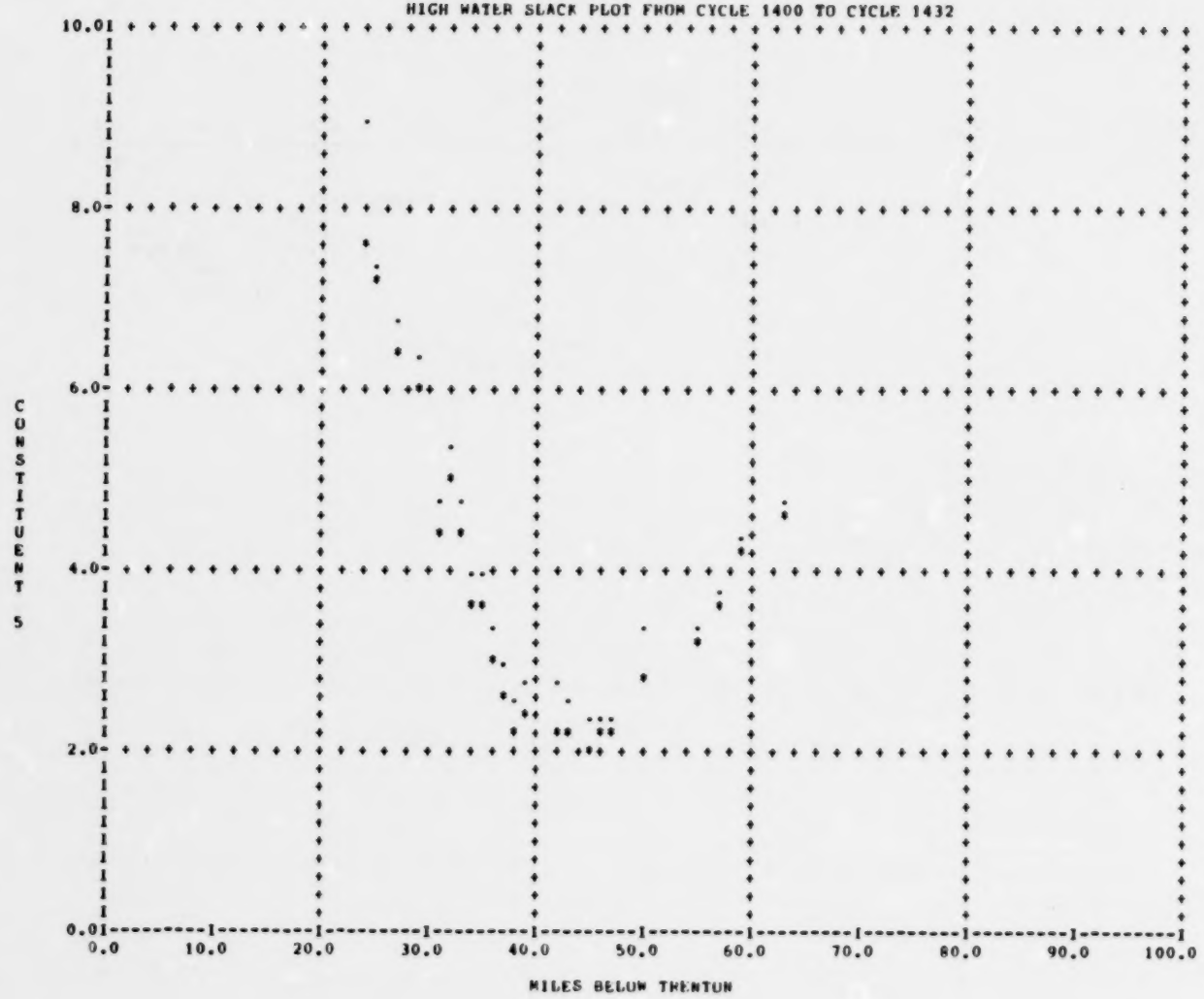
HIGH WATER SLACK PLOT FROM CYCLE 1400 TO CYCLE 1432

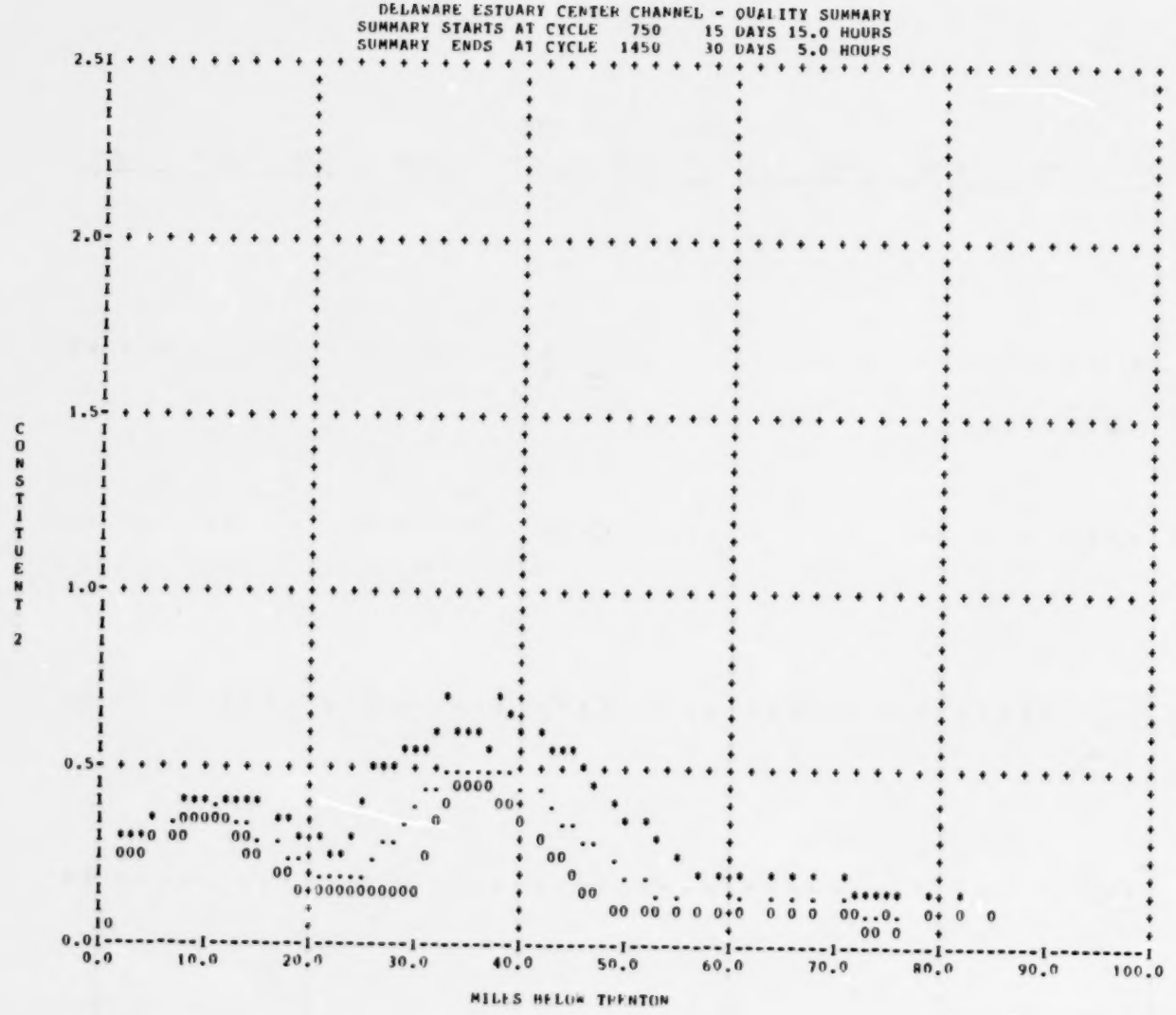


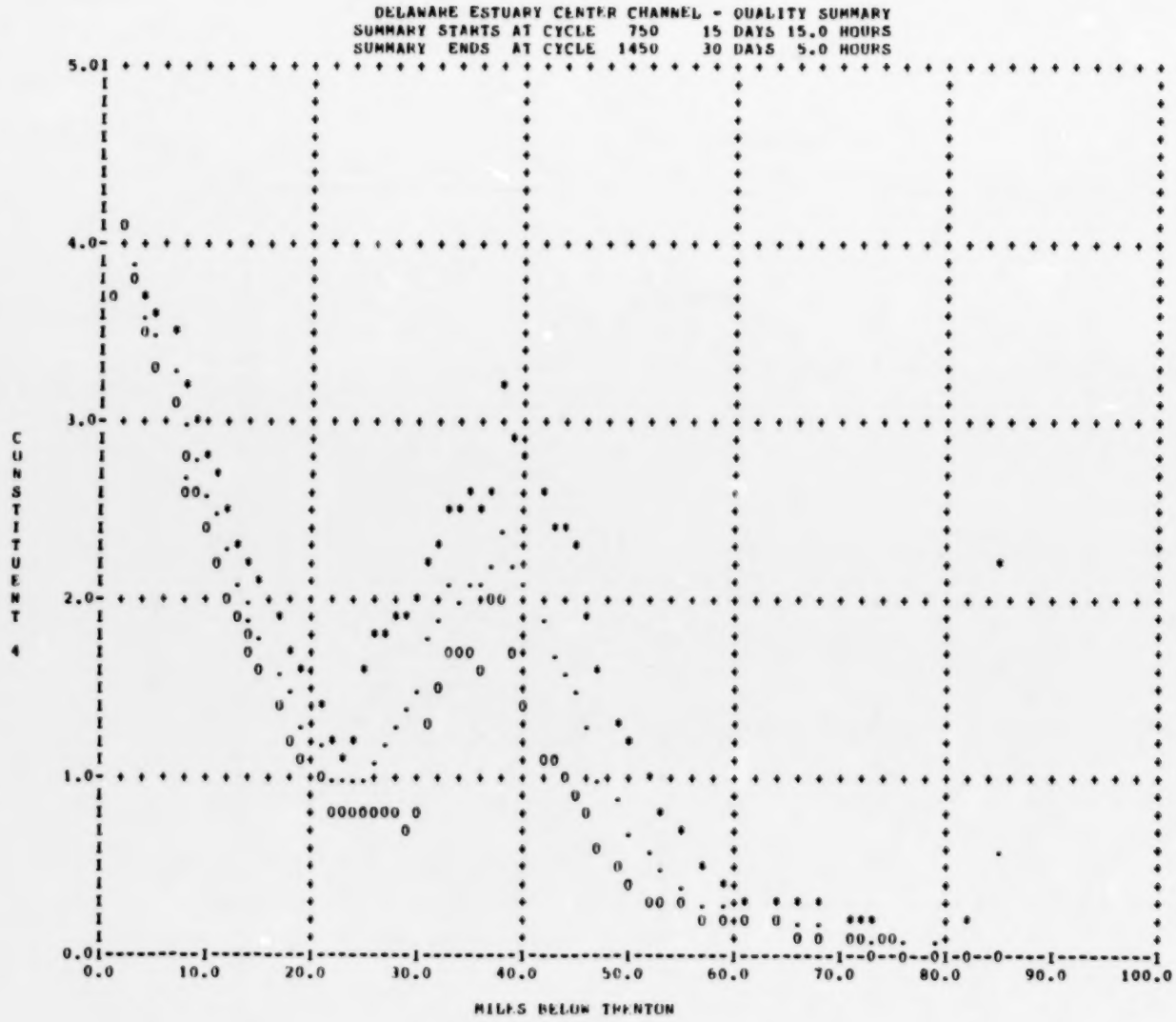

DELAWARE ESTUARY PA-DEL SIDE
HIGH WATER SLACK PLOT FROM CYCLE 1400 TO CYCLE 1432
10.01
8.0
6.0
4.0
2.0
0.01
CONSTITUENTS
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
MILES BELOW TRENTON

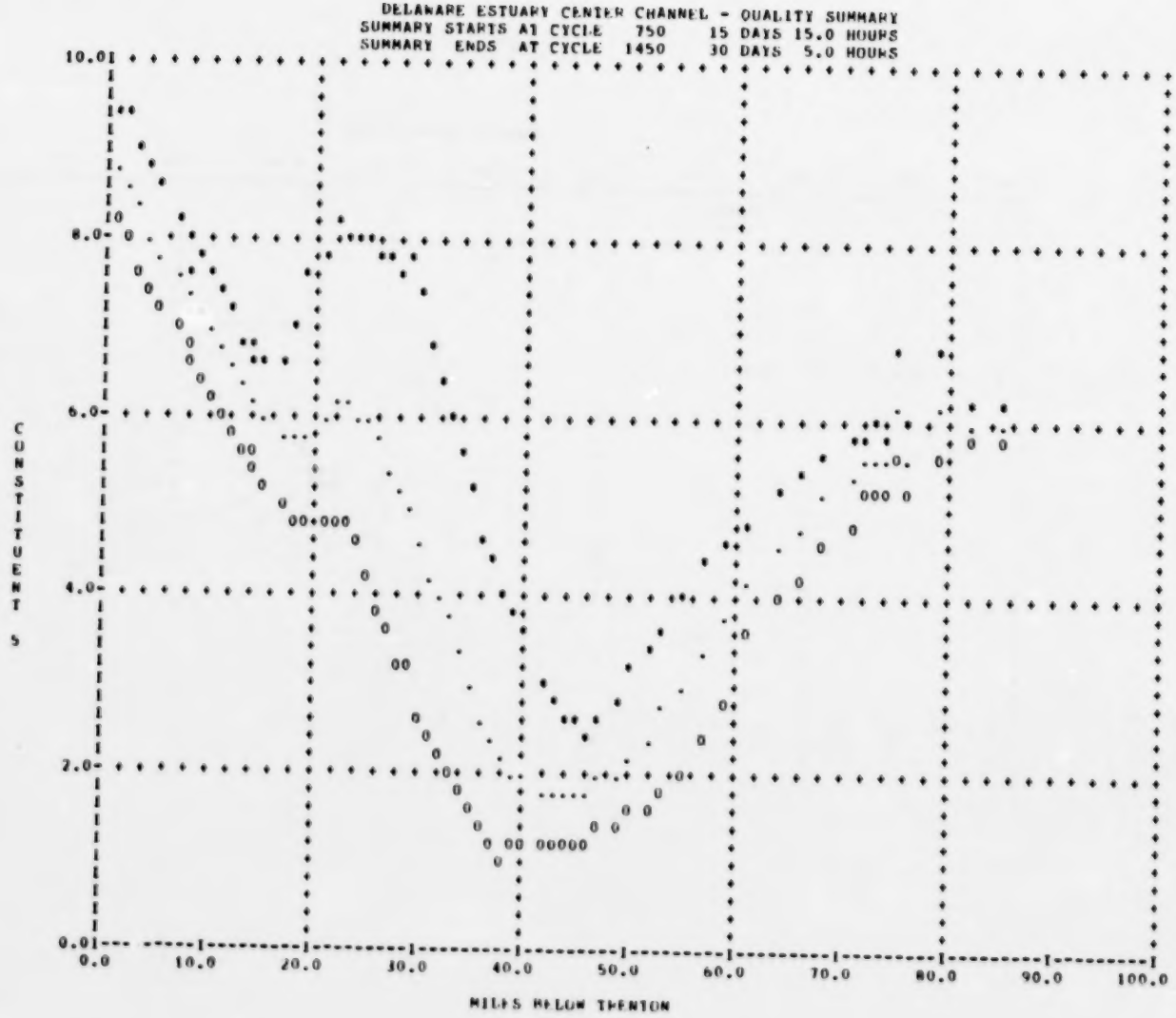
DELAWARE ESTUARY NJ SIDE

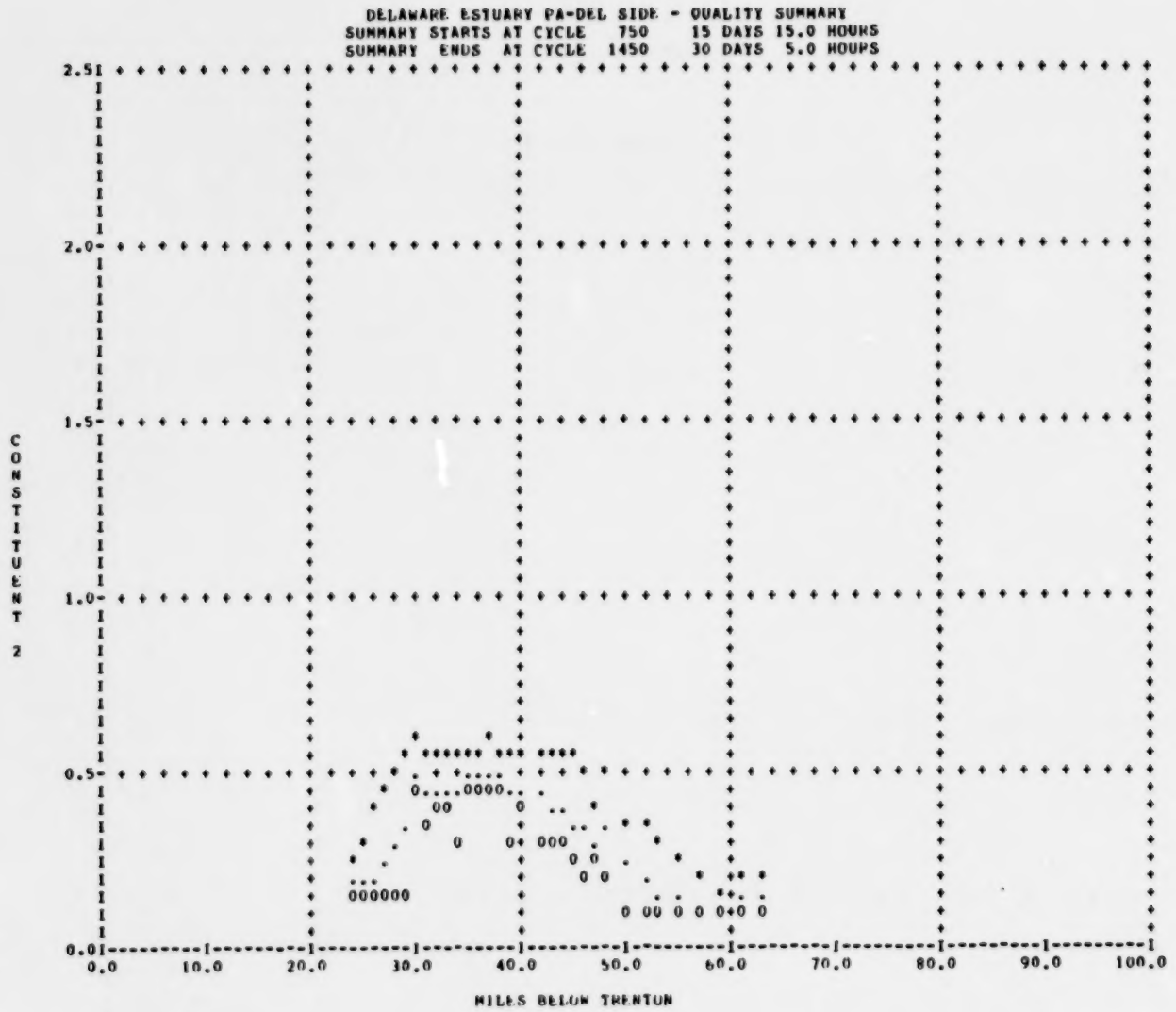
HIGH WATER SLACK PLOT FROM CYCLE 1400 TO CYCLE 1432

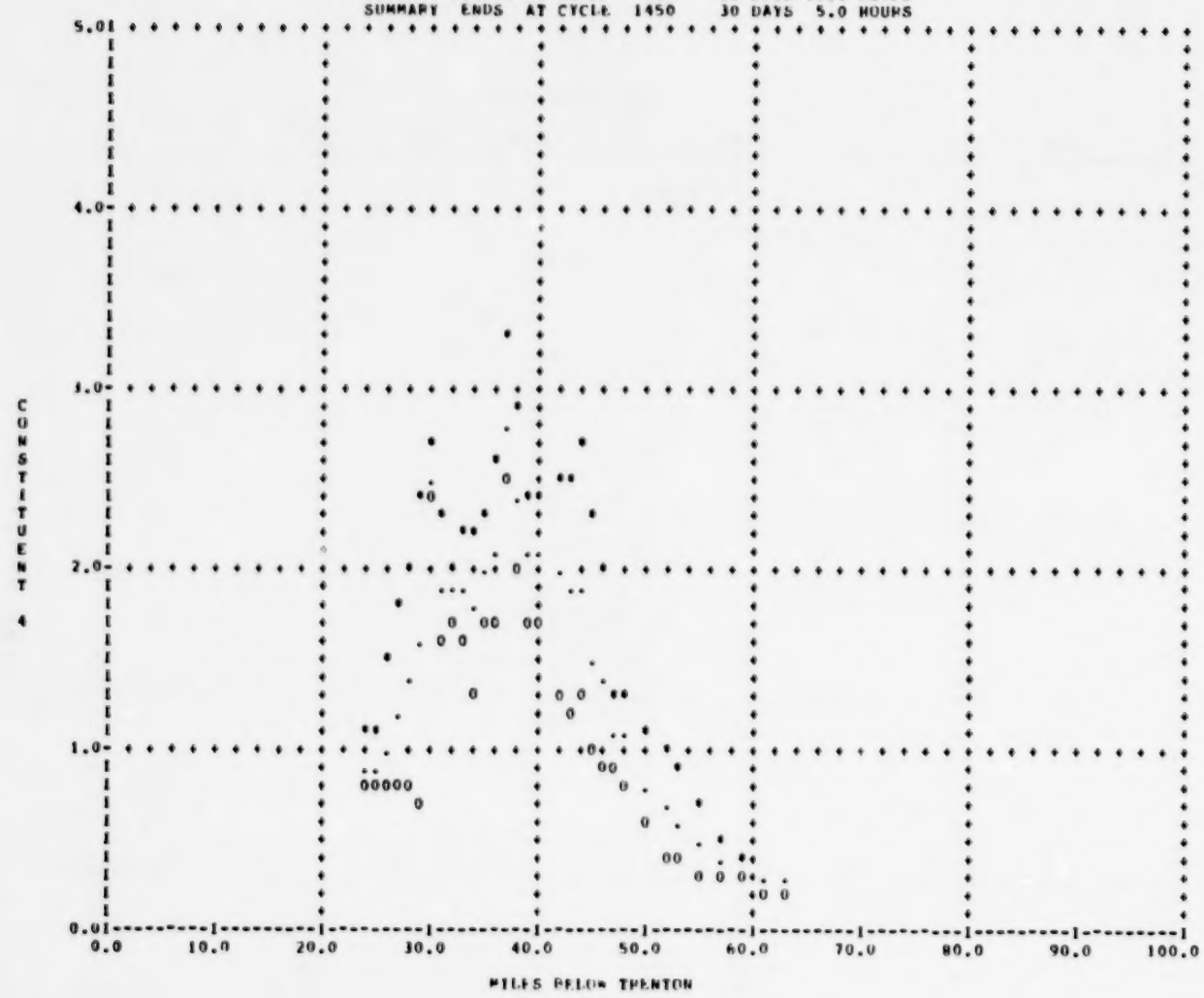


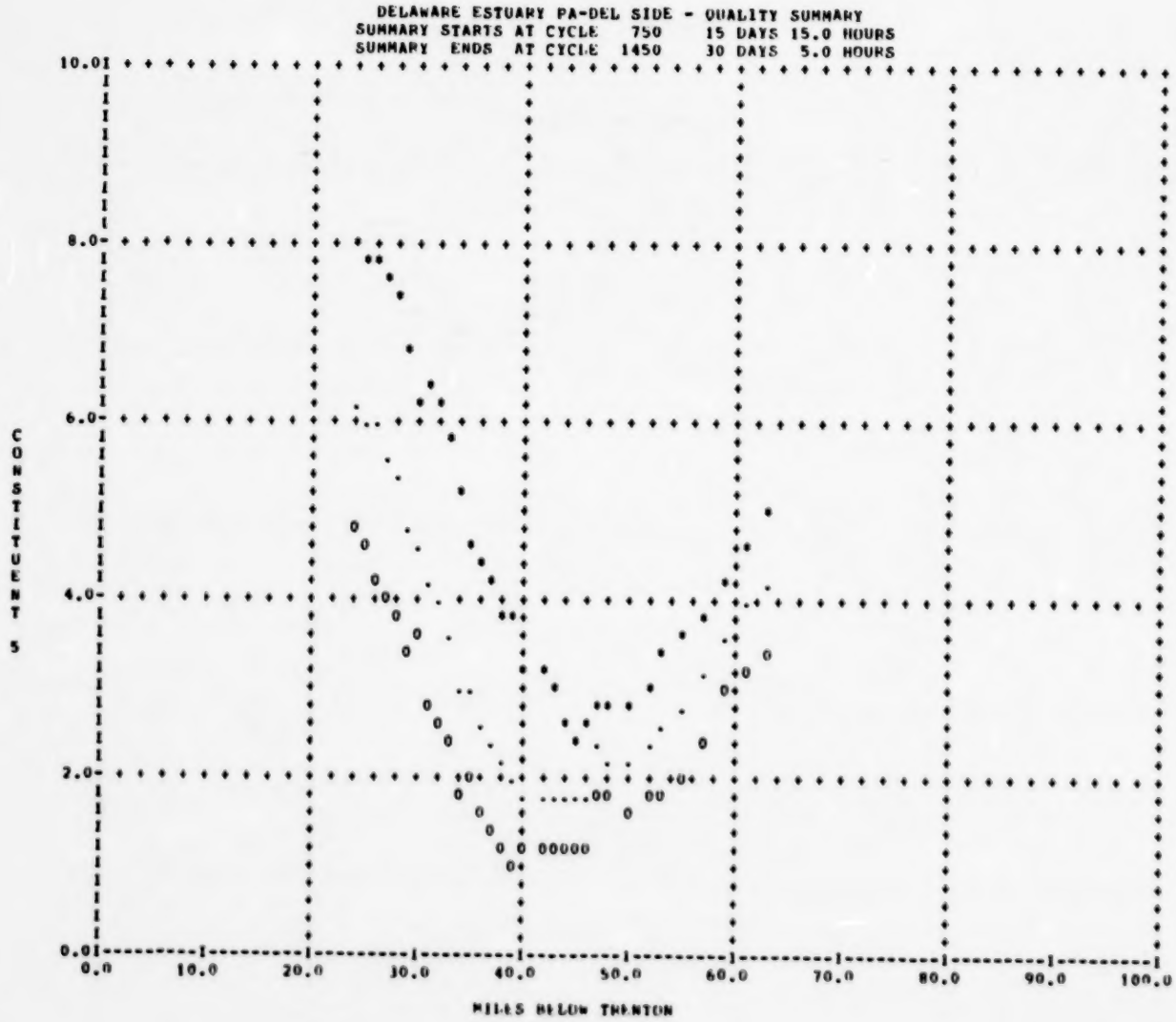

DELAWARE ESTUARY CENTER CHANNEL - QUALITY SUMMARY
SUMMARY STARTS AT CYCLE 750 15 DAYS 15.0 HOURS
SUMMARY ENDS AT CYCLE 1450 30 DAYS 5.0 HOURS
CONSTITUENT 2
2.5
2.0
1.5
1.0
0.5
0.01
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
MILES BELOW TRENTON

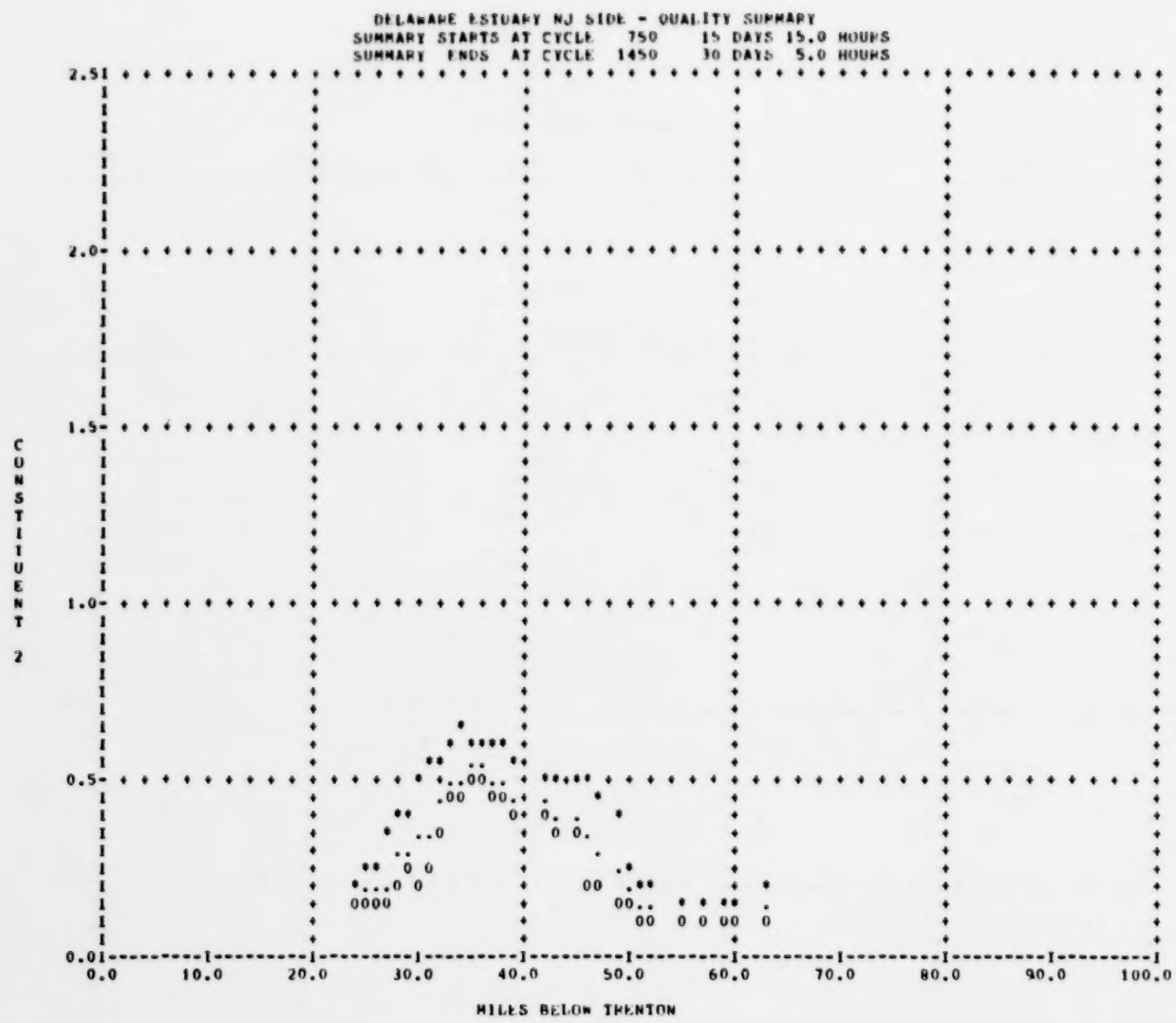

DELAWARE ESTUARY CENTER CHANNEL - QUALITY SUMMARY
SUMMARY STARTS AT CYCLE 750 15 DAYS 15.0 HOURS
SUMMARY ENDS AT CYCLE 1450 30 DAYS 5.0 HOURS
CONSTITUENT 4
5.0
4.0
3.0
2.0
1.0
0.0
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
MILES BELOW TRENTON

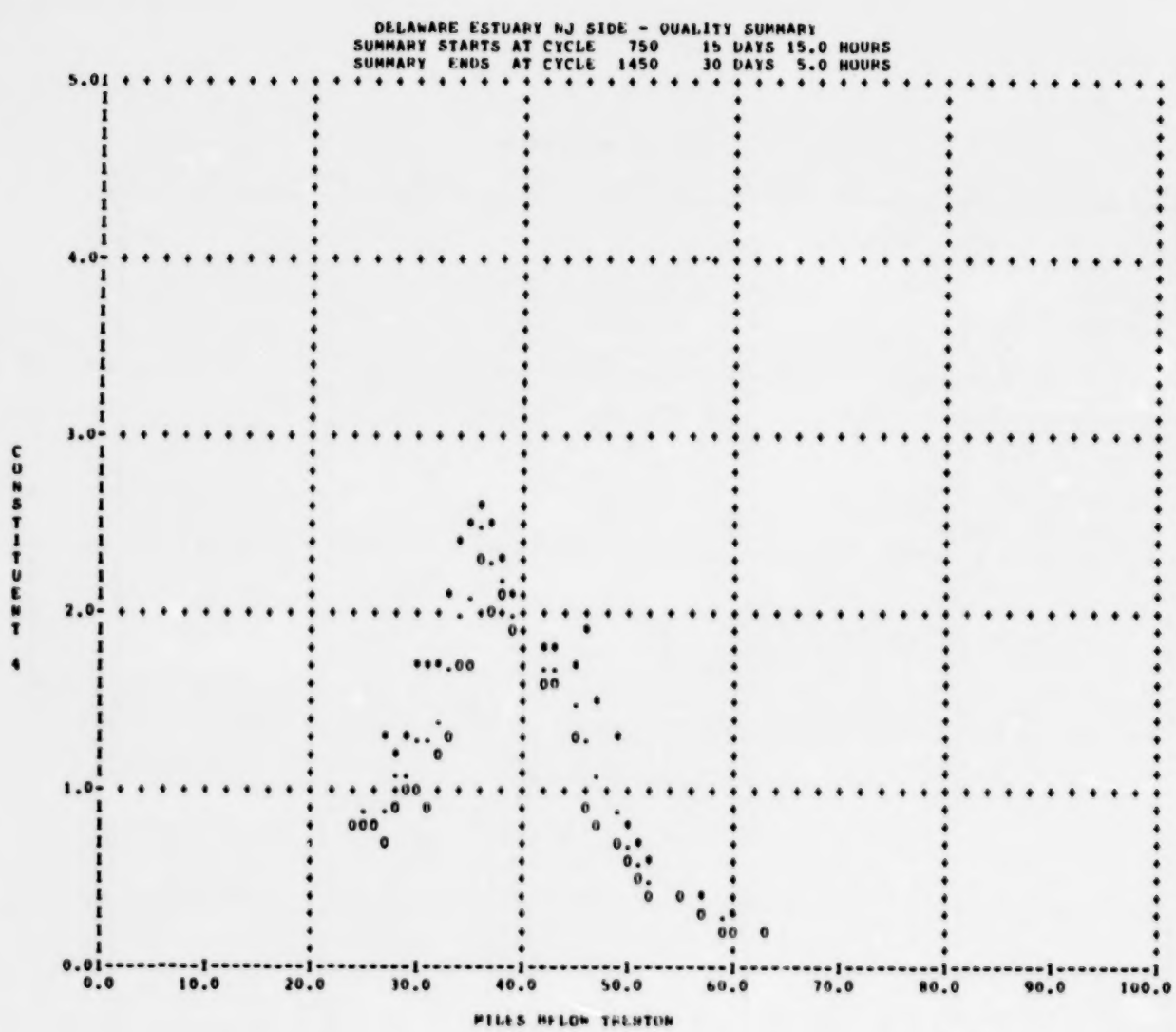

DELAWARE ESTUARY CENTER CHANNEL - QUALITY SUMMARY
SUMMARY STARTS AT CYCLE 750 15 DAYS 15.0 HOURS
SUMMARY ENDS AT CYCLE 1450 30 DAYS 5.0 HOURS
CONSTITUENTS
10.0
8.0
6.0
4.0
2.0
0.0
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
MILES BELOW TRENTON

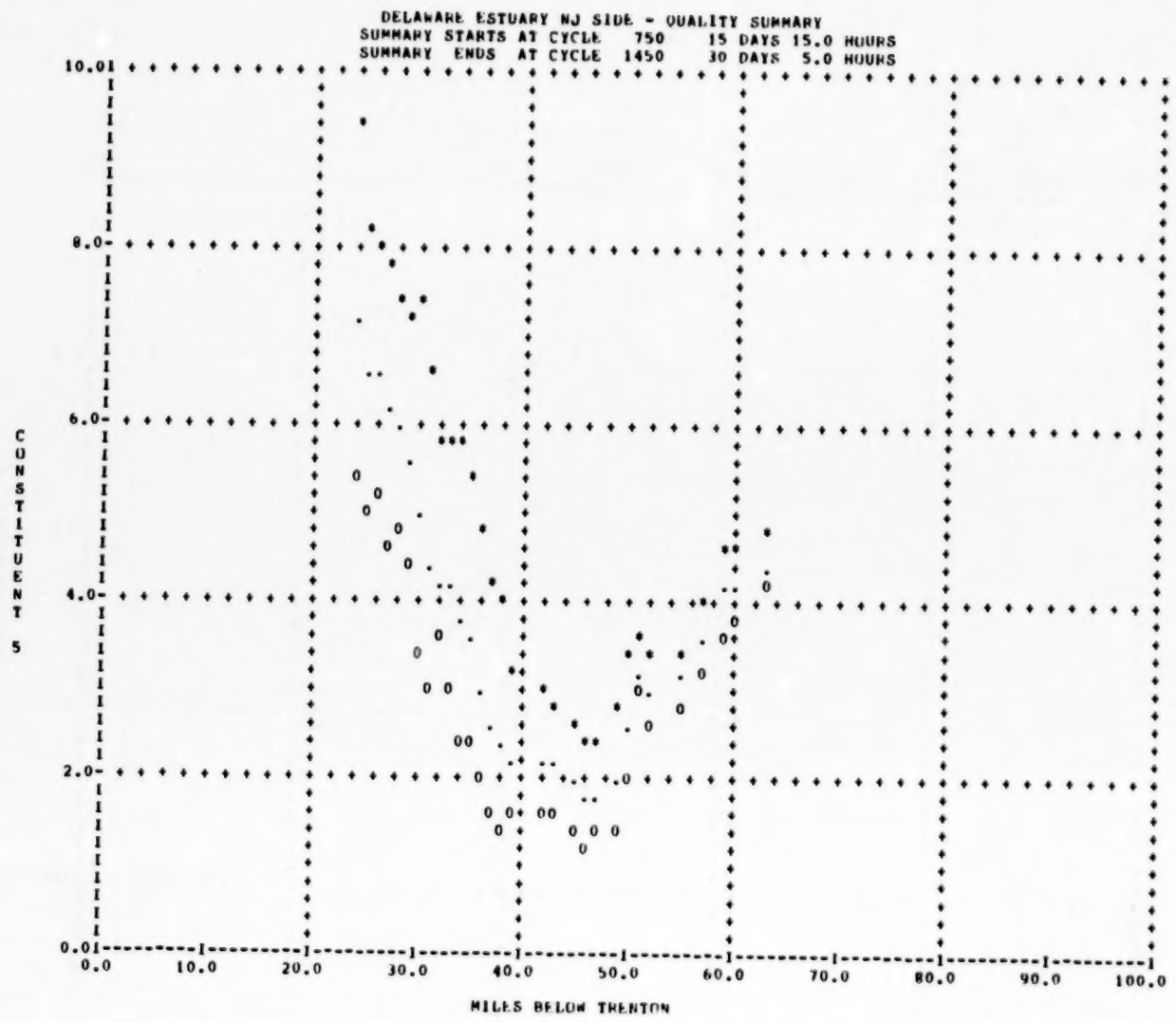

DELAWARE ESTUARY PA-DEL SIDE - QUALITY SUMMARY
SUMMARY STARTS AT CYCLE 750 15 DAYS 15.0 HOURS
SUMMARY ENDS AT CYCLE 1450 30 DAYS 5.0 HOURS
CONSTITUENT 2
2.5
2.0
1.5
1.0
0.5
0.0
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
MILES BELOW TRENTON

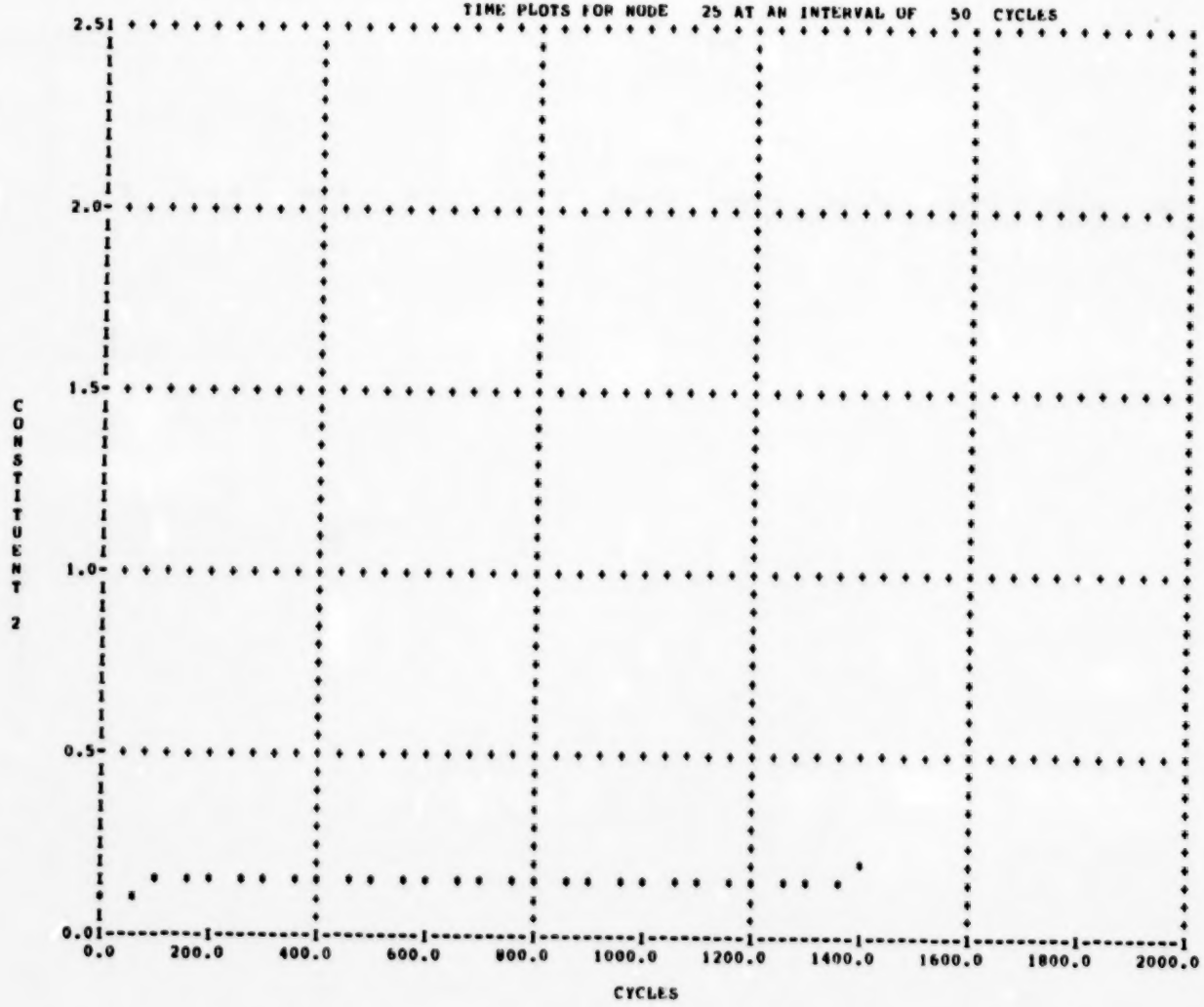

DELAWARE ESTUARY PA-DEL SIDE - QUALITY SUMMARY
SUMMARY STARTS AT CYCLE 750 15 DAYS 15.0 HOURS
SUMMARY ENDS AT CYCLE 1450 30 DAYS 5.0 HOURS
CONSTITUENT 4
5.0
4.0
3.0
2.0
1.0
0.0
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
MILES BELOW TRENTON

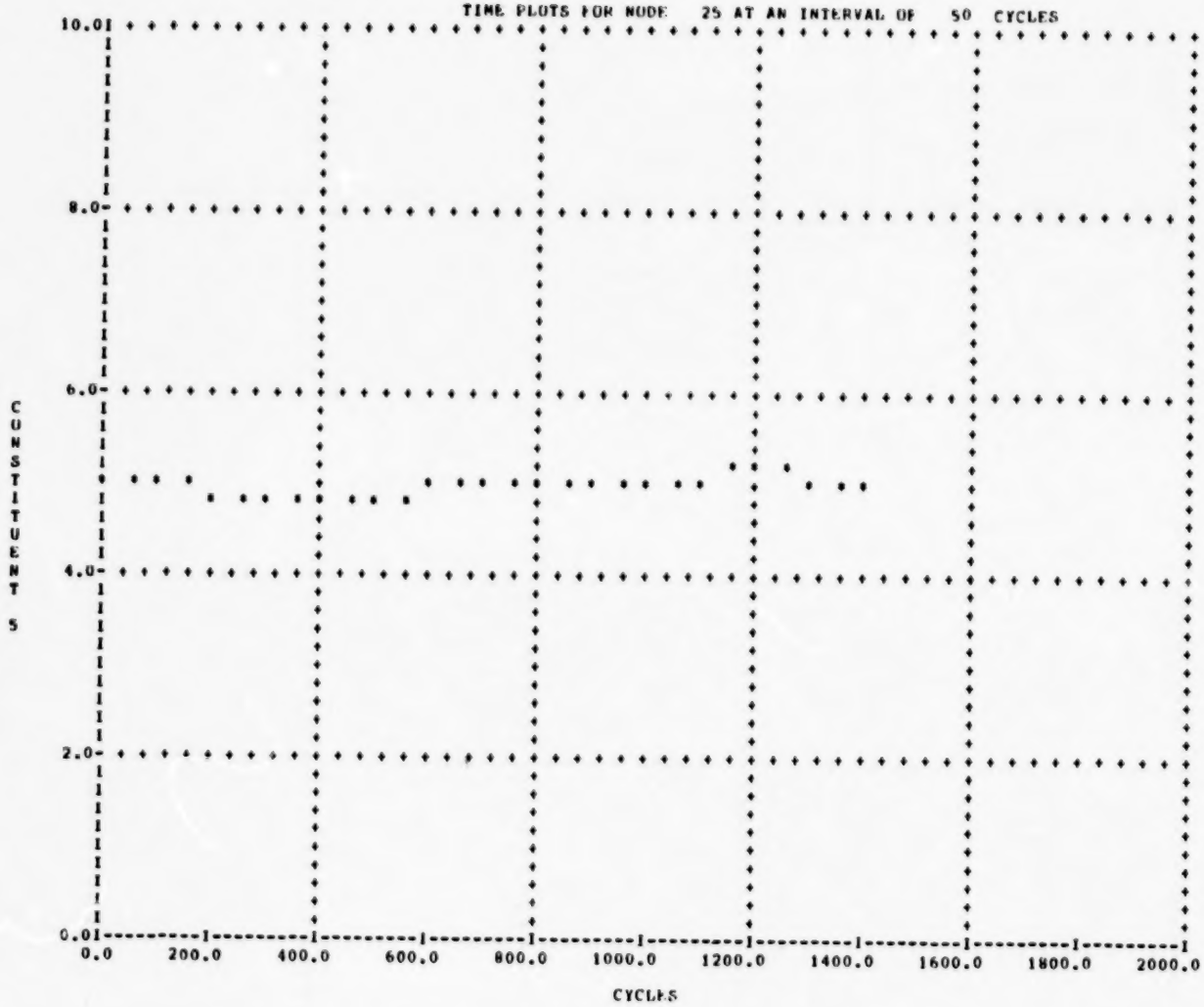

DELAWARE ESTUARY PA-DEL SIDE - QUALITY SUMMARY
SUMMARY STARTS AT CYCLE 750 15 DAYS 15.0 HOURS
SUMMARY ENDS AT CYCLE 1450 30 DAYS 5.0 HOURS
CONSTITUENT 5
10.0
8.0
6.0
4.0
2.0
0.0
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
MILES BELOW TRENTON

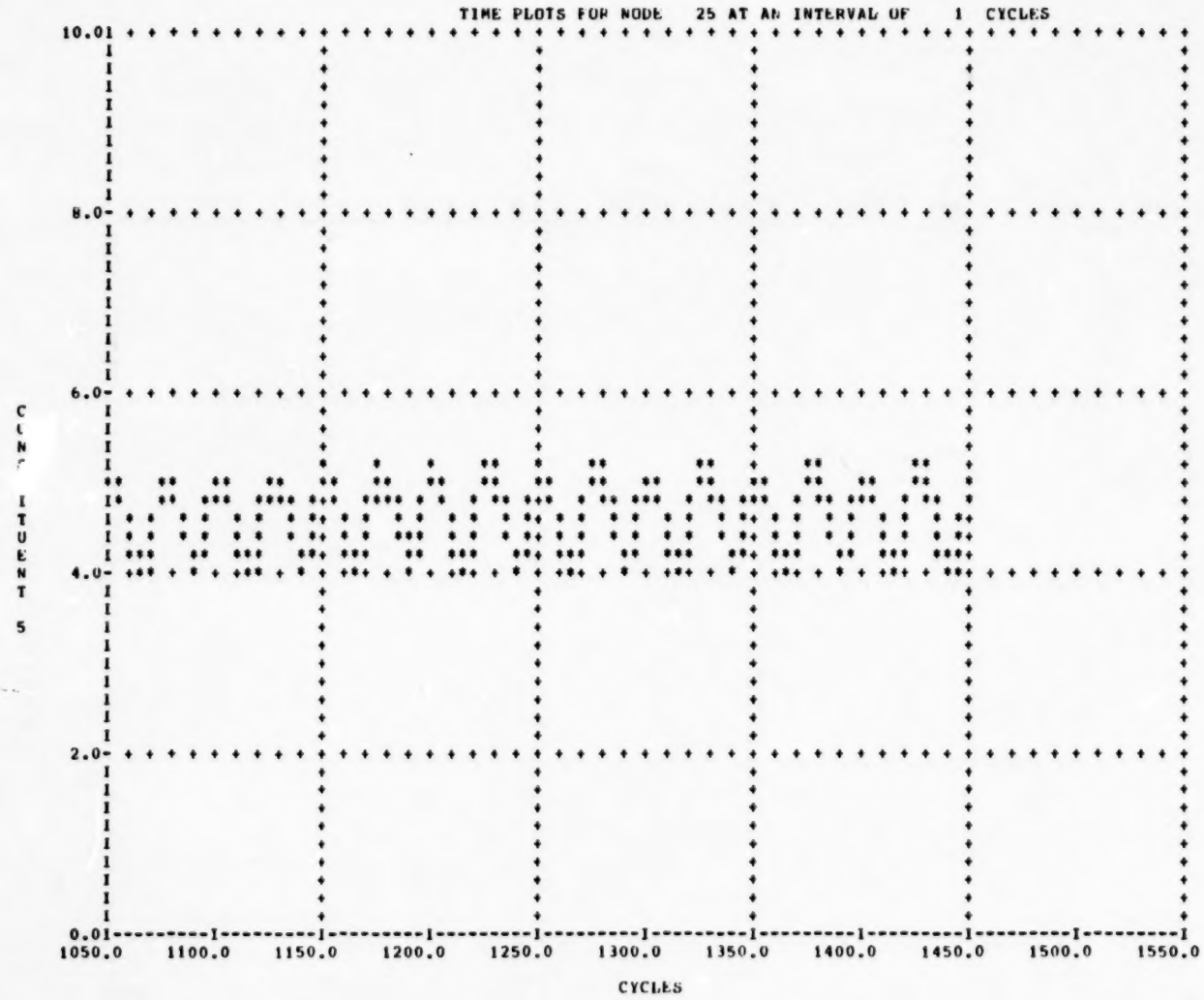

DELAWARE ESTUARY NJ SIDE - QUALITY SUMMARY
SUMMARY STARTS AT CYCLE 750 15 DAYS 15.0 HOURS
SUMMARY ENDS AT CYCLE 1450 30 DAYS 5.0 HOURS
CONSTITUENT 2
2.5
2.0
1.5
1.0
0.5
0.01
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
MILES BELOW TRENTON

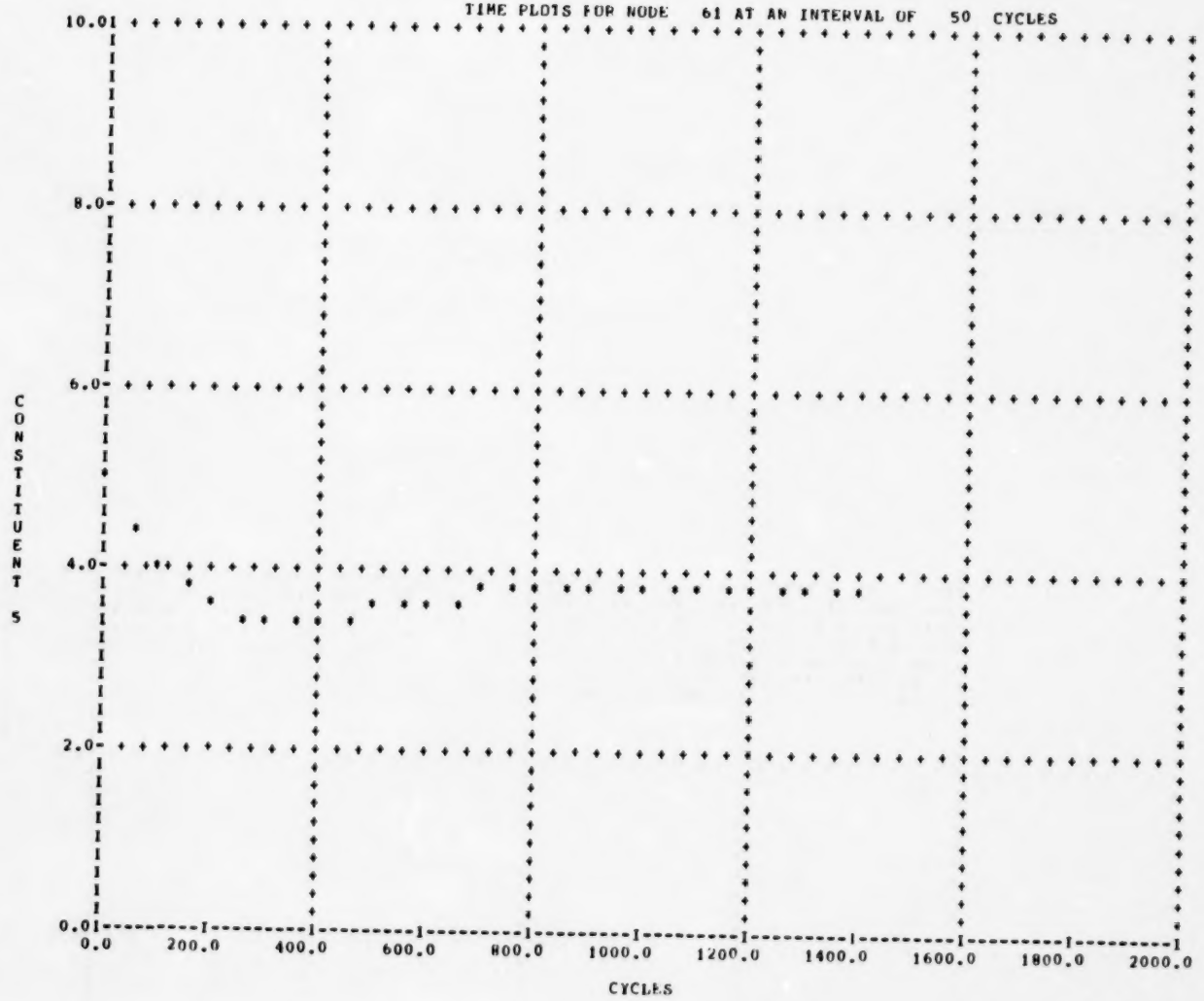

DELAWARE ESTUARY NJ SIDE - QUALITY SUMMARY
SUMMARY STARTS AT CYCLE 750 15 DAYS 15.0 HOURS
SUMMARY ENDS AT CYCLE 1450 30 DAYS 5.0 HOURS
CONSTITUENT 4
5.0
4.0
3.0
2.0
1.0
0.0
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
MILES BELOW TRENTON

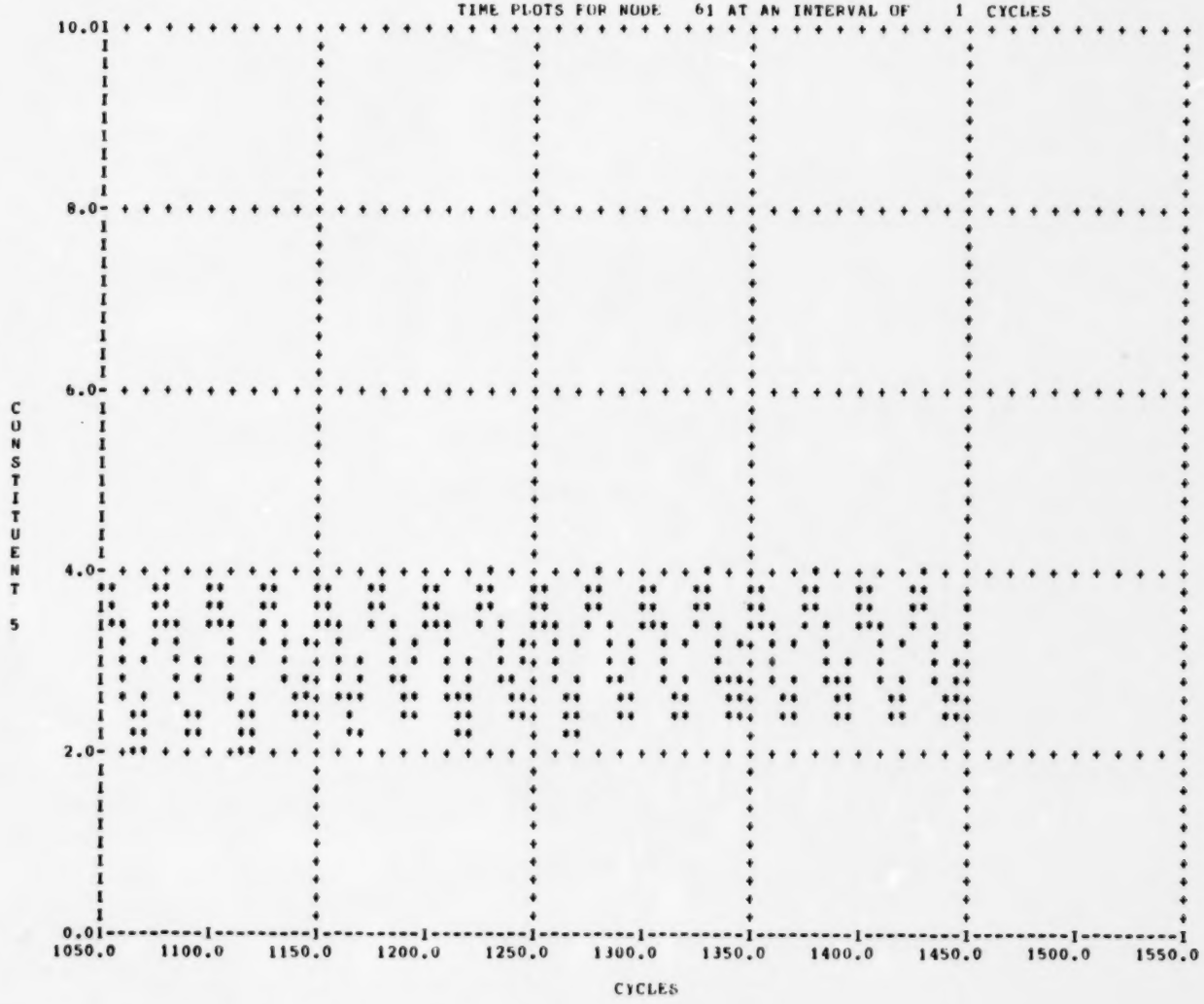

DELAWARE ESTUARY NJ SIDE - QUALITY SUMMARY
SUMMARY STARTS AT CYCLE 750 15 DAYS 15.0 HOURS
SUMMARY ENDS AT CYCLE 1450 30 DAYS 5.0 HOURS
CONSTITUENT 5
10.0
8.0
6.0
4.0
2.0
0.0
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
MILES BELOW TRENTON

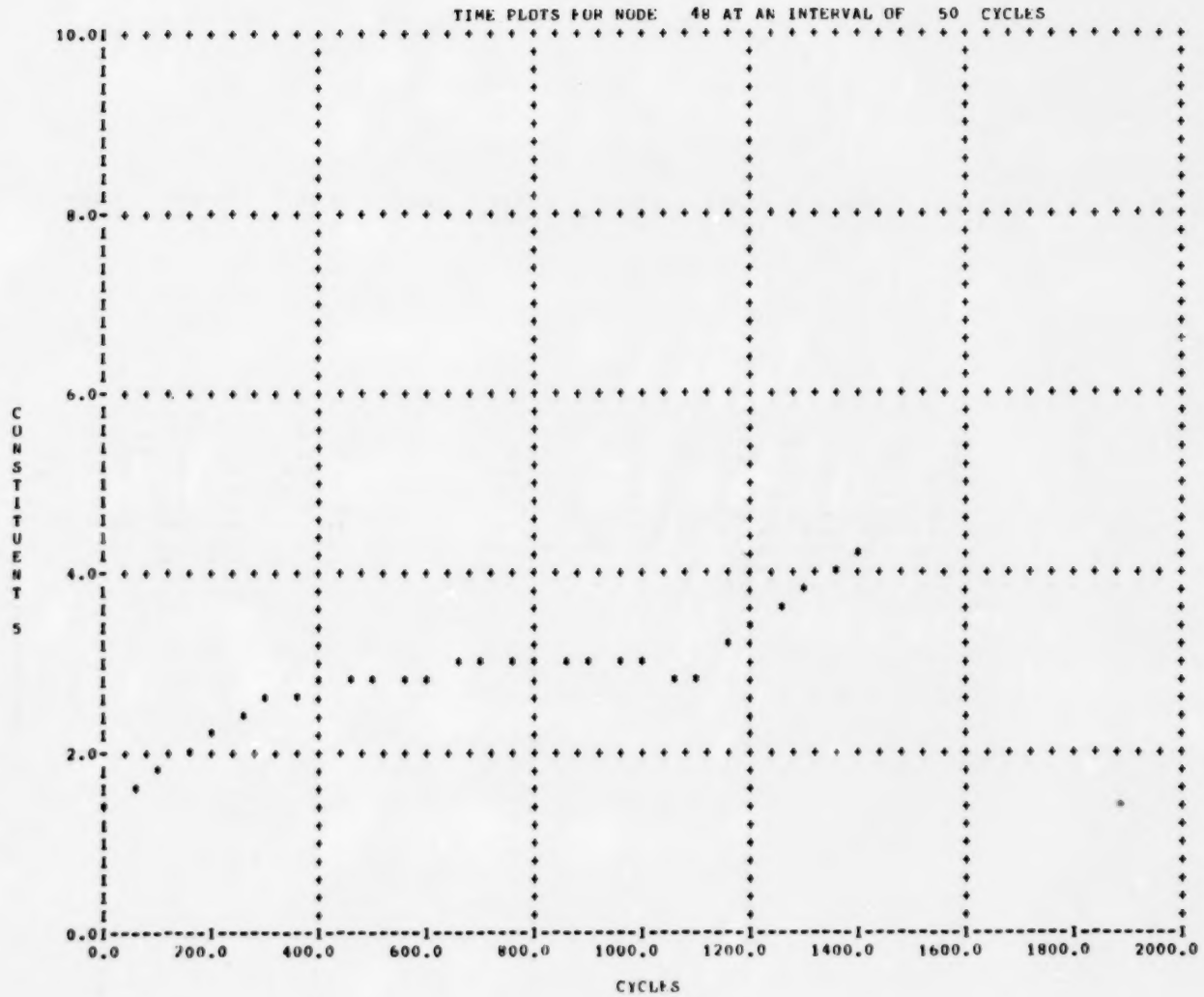

TIME PLOTS FOR NODE 25 AT AN INTERVAL OF 50 CYCLES
2.5
2.0
1.5
1.0
0.5
0.0
CONSTITUENT 2
0.0
200.0
400.0
600.0
800.0
1000.0
1200.0
1400.0
1600.0
1800.0
2000.0
CYCLES

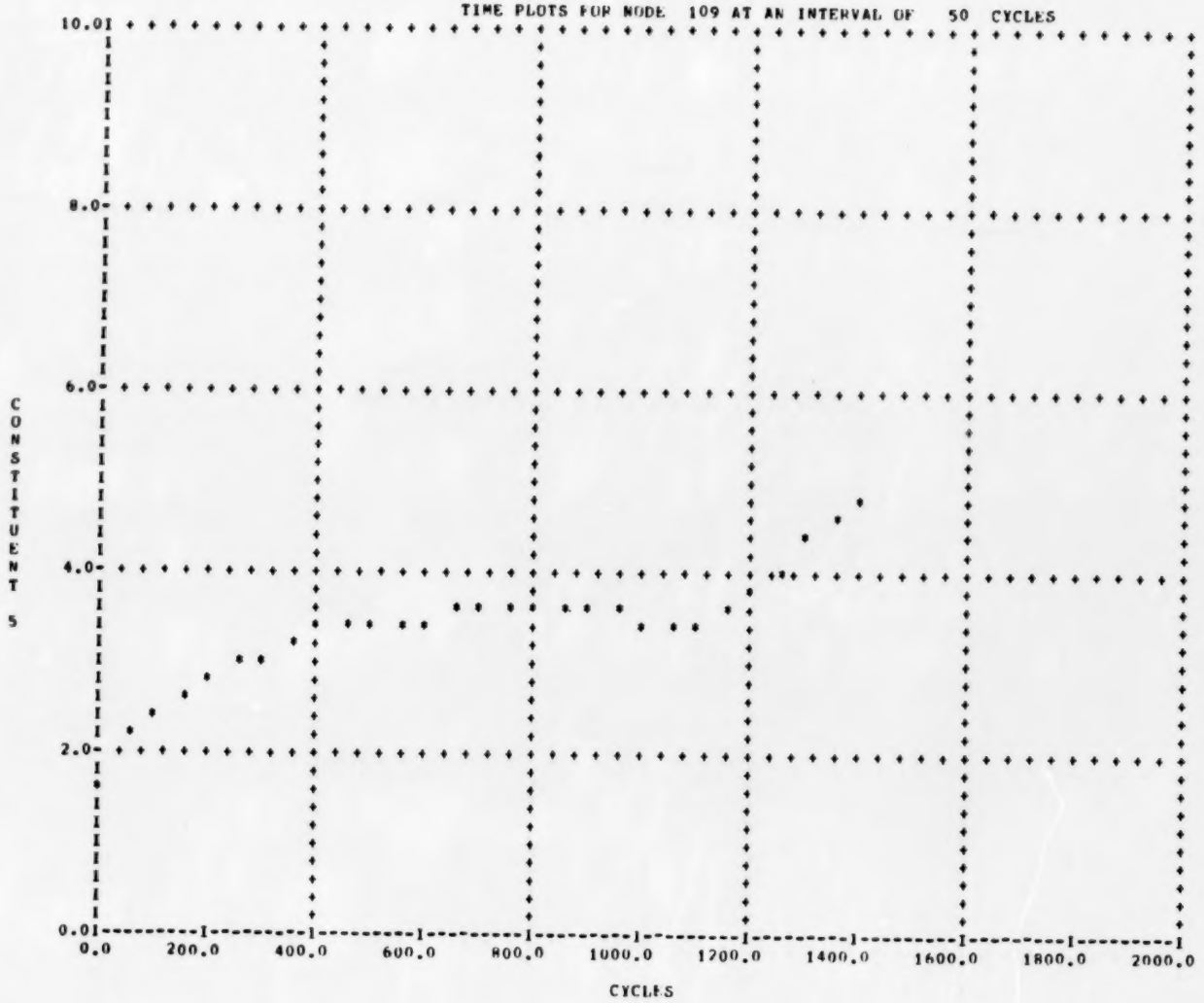

TIME PLOTS FOR NODE 25 AT AN INTERVAL OF 50 CYCLES
10.0
8.0
6.0
4.0
2.0
0.0
CONSTITUENTS
0.0
200.0
400.0
600.0
800.0
1000.0
1200.0
1400.0
1600.0
1800.0
2000.0
CYCLES

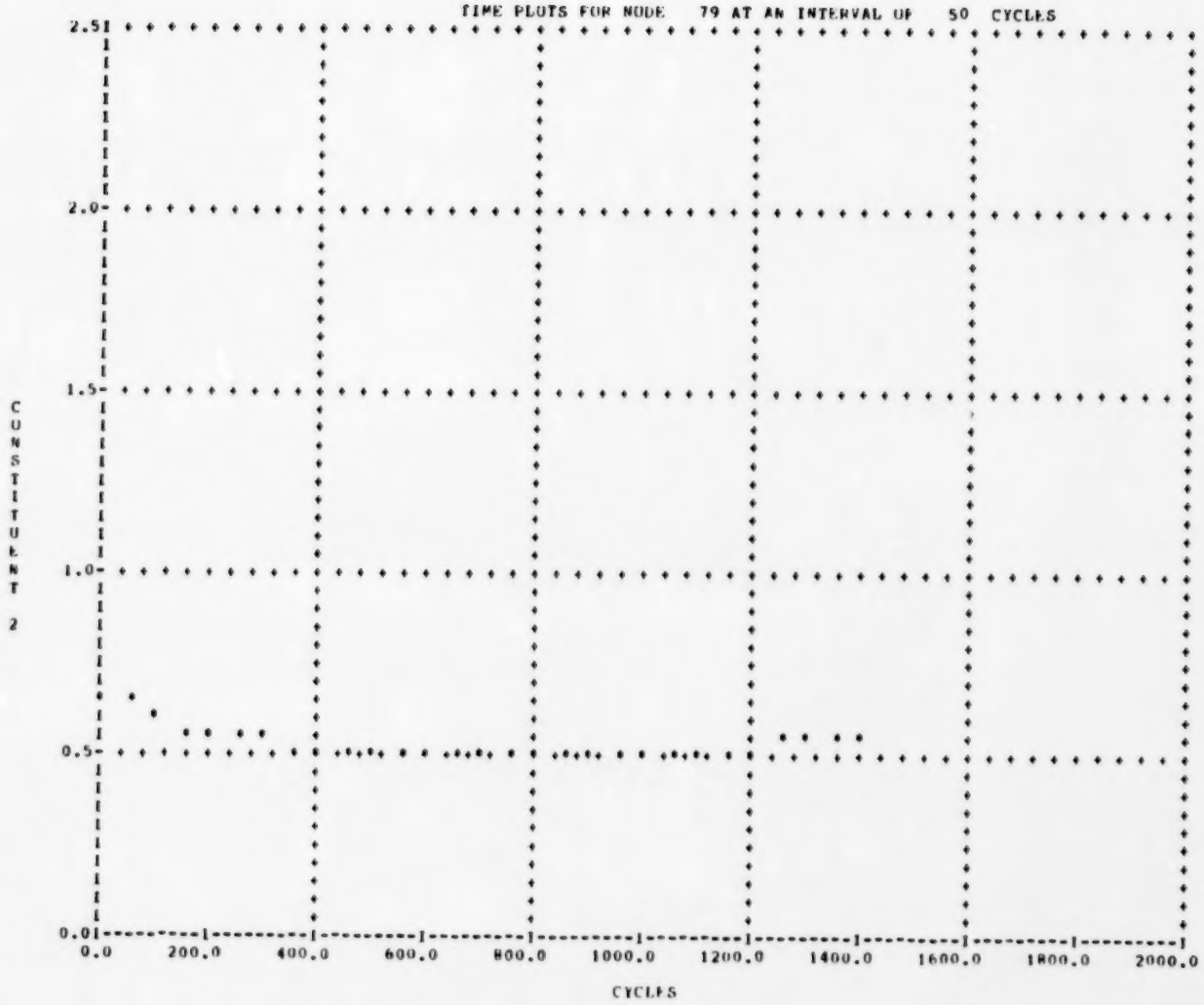

TIME PLOTS FOR NODE 25 AT AN INTERVAL OF 1 CYCLES
10.01
8.0
6.0
4.0
2.0
0.01
CONSTITUENT 5
1050.0
1100.0
1150.0
1200.0
1250.0
1300.0
1350.0
1400.0
1450.0
1500.0
1550.0
CYCLES

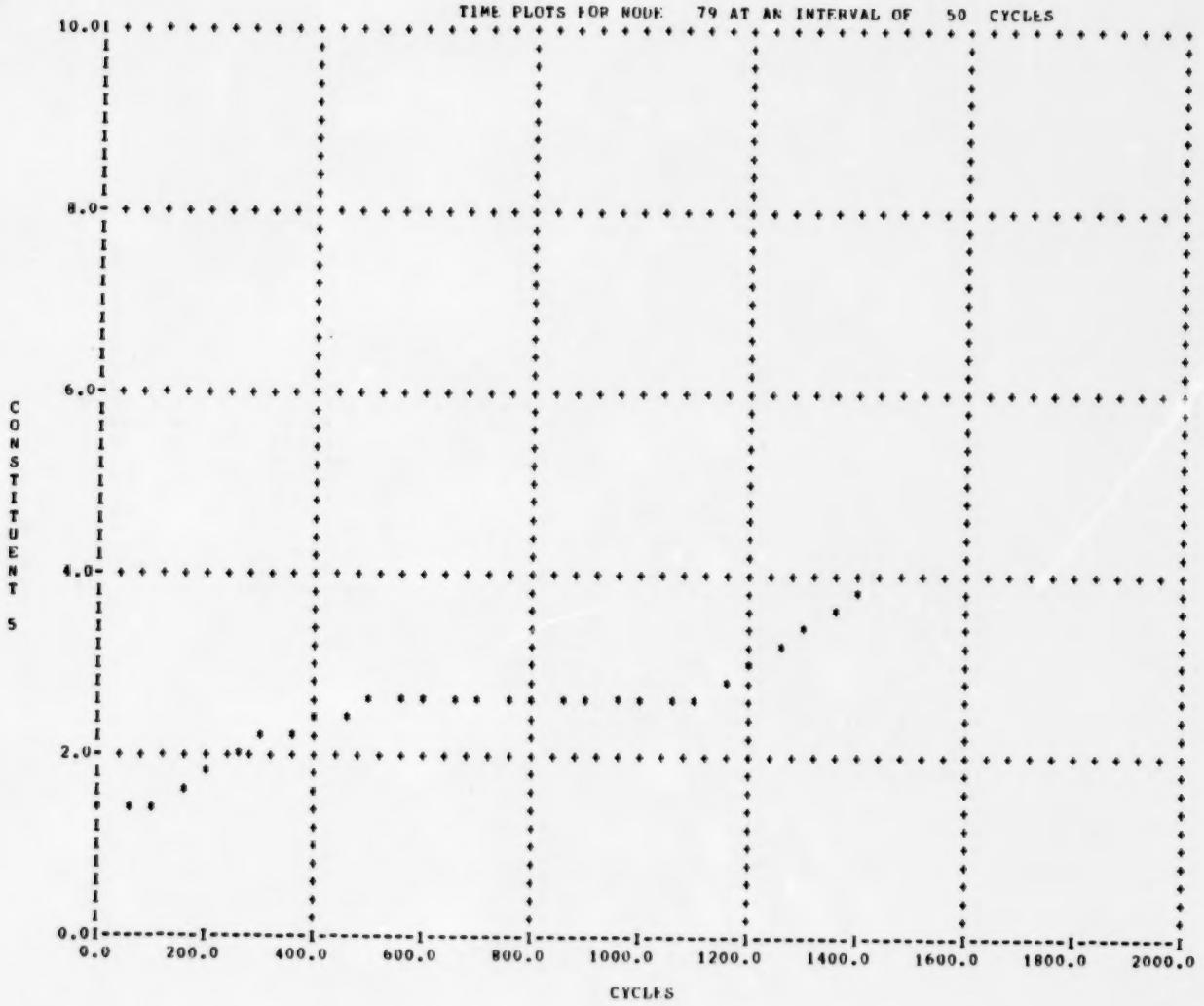

TIME PLOTS FOR NODE 61 AT AN INTERVAL OF 50 CYCLES
10.0
8.0
6.0
4.0
2.0
0.0
CONSTITUENTS
0.0
200.0
400.0
600.0
800.0
1000.0
1200.0
1400.0
1600.0
1800.0
2000.0
CYCLES


TIME PLOTS FOR NODE 61 AT AN INTERVAL OF 1 CYCLES
10.0
8.0
6.0
4.0
2.0
0.0
CONSTITUENT 5
1050.0
1100.0
1150.0
1200.0
1250.0
1300.0
1350.0
1400.0
1450.0
1500.0
1550.0
CYCLES


TIME PLOTS FOR NODE 48 AT AN INTERVAL OF 50 CYCLES
10.0
8.0
6.0
4.0
2.0
0.0
CONSTITUENT 5
0.0
200.0
400.0
600.0
800.0
1000.0
1200.0
1400.0
1600.0
1800.0
2000.0
CYCLES


TIME PLOTS FOR NODE 109 AT AN INTERVAL OF 50 CYCLES
CONSTITUENT 5
10.0
8.0
6.0
4.0
2.0
0.0
0.0
200.0
400.0
600.0
800.0
1000.0
1200.0
1400.0
1600.0
1800.0
2000.0
CYCLES


TIME PLOTS FOR NODE 79 AT AN INTERVAL OF 50 CYCLES
CONSTITUENT 2
2.5
2.0
1.5
1.0
0.5
0.01
0.0
200.0
400.0
600.0
800.0
1000.0
1200.0
1400.0
1600.0
1800.0
2000.0
CYCLES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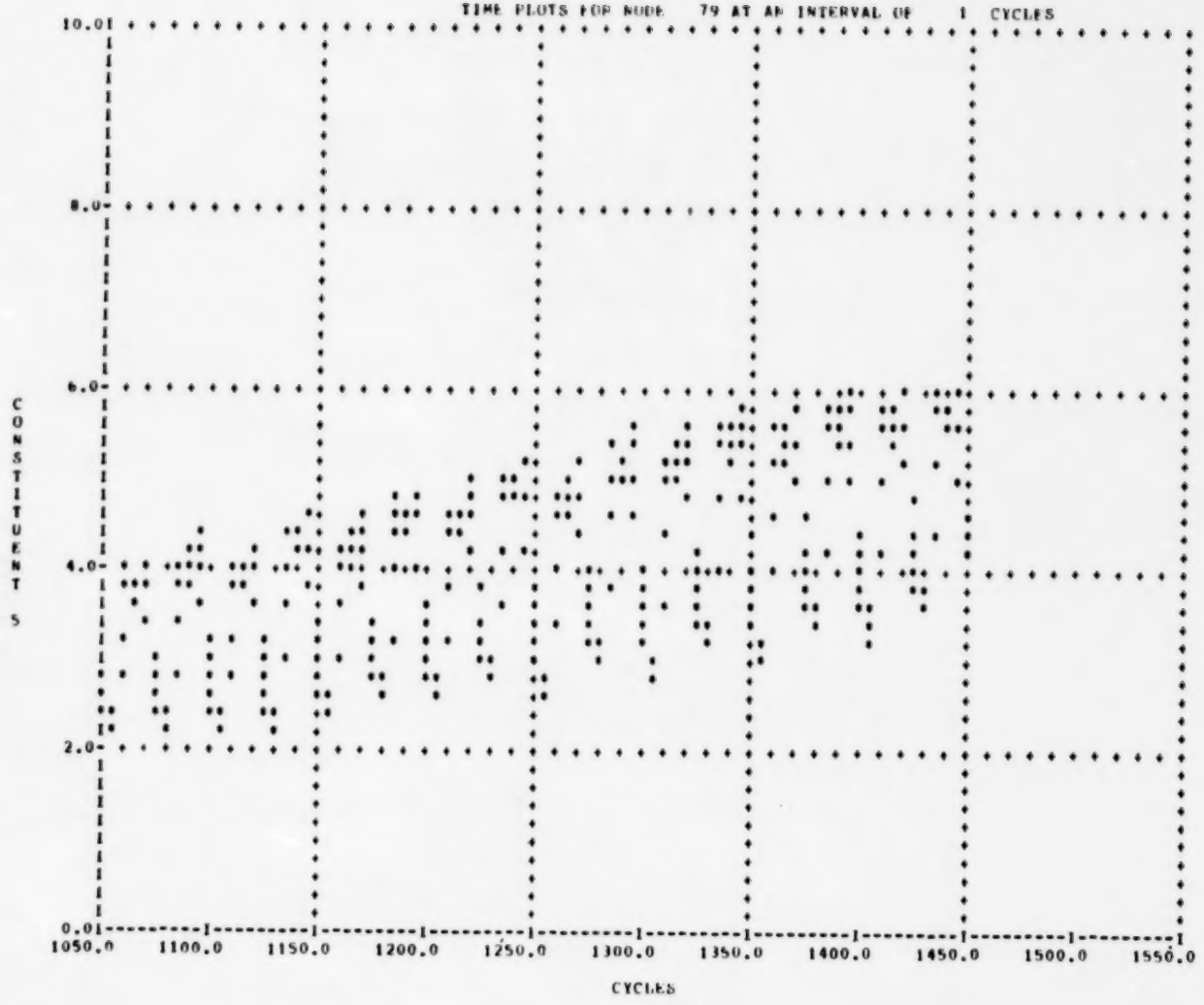
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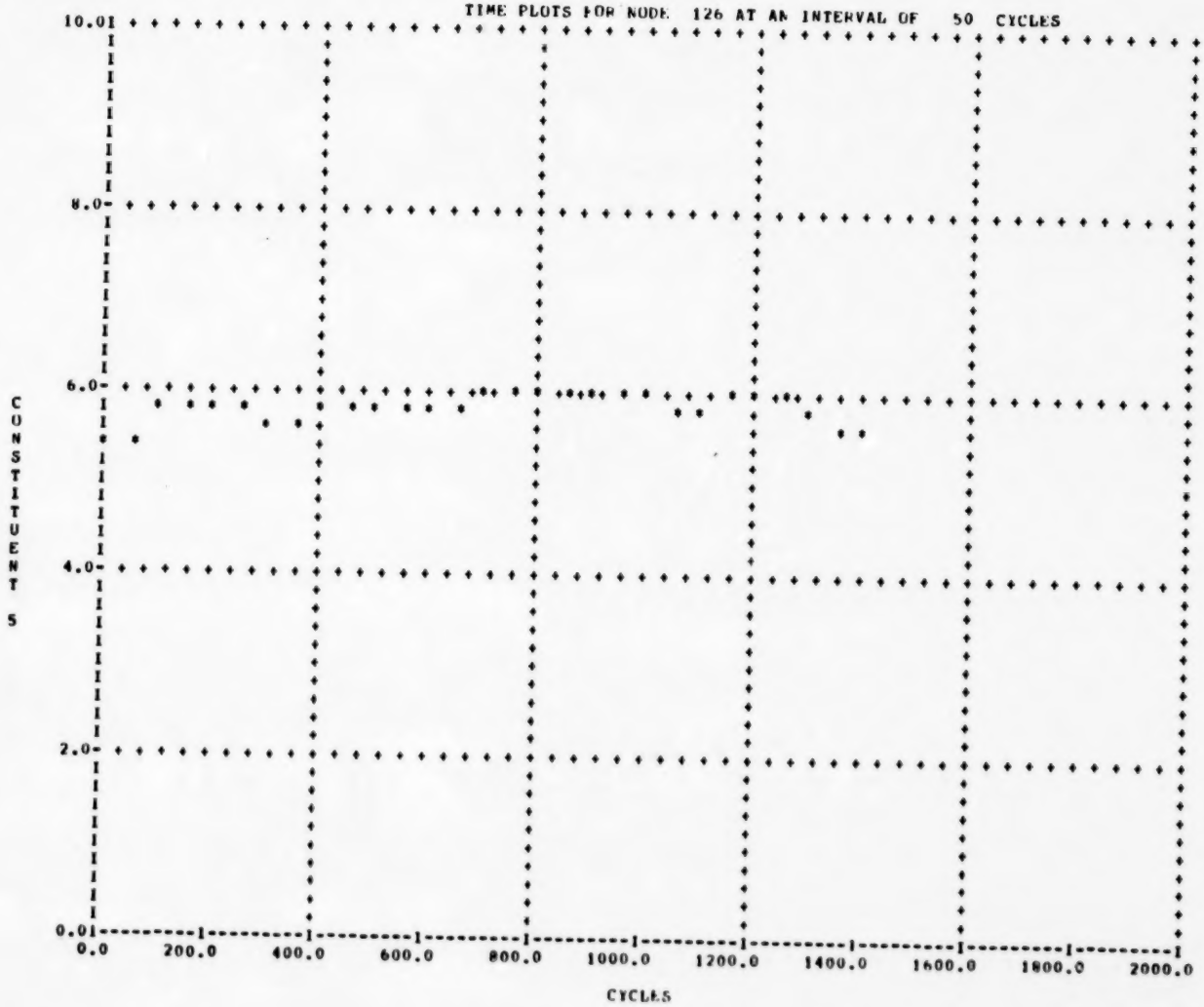
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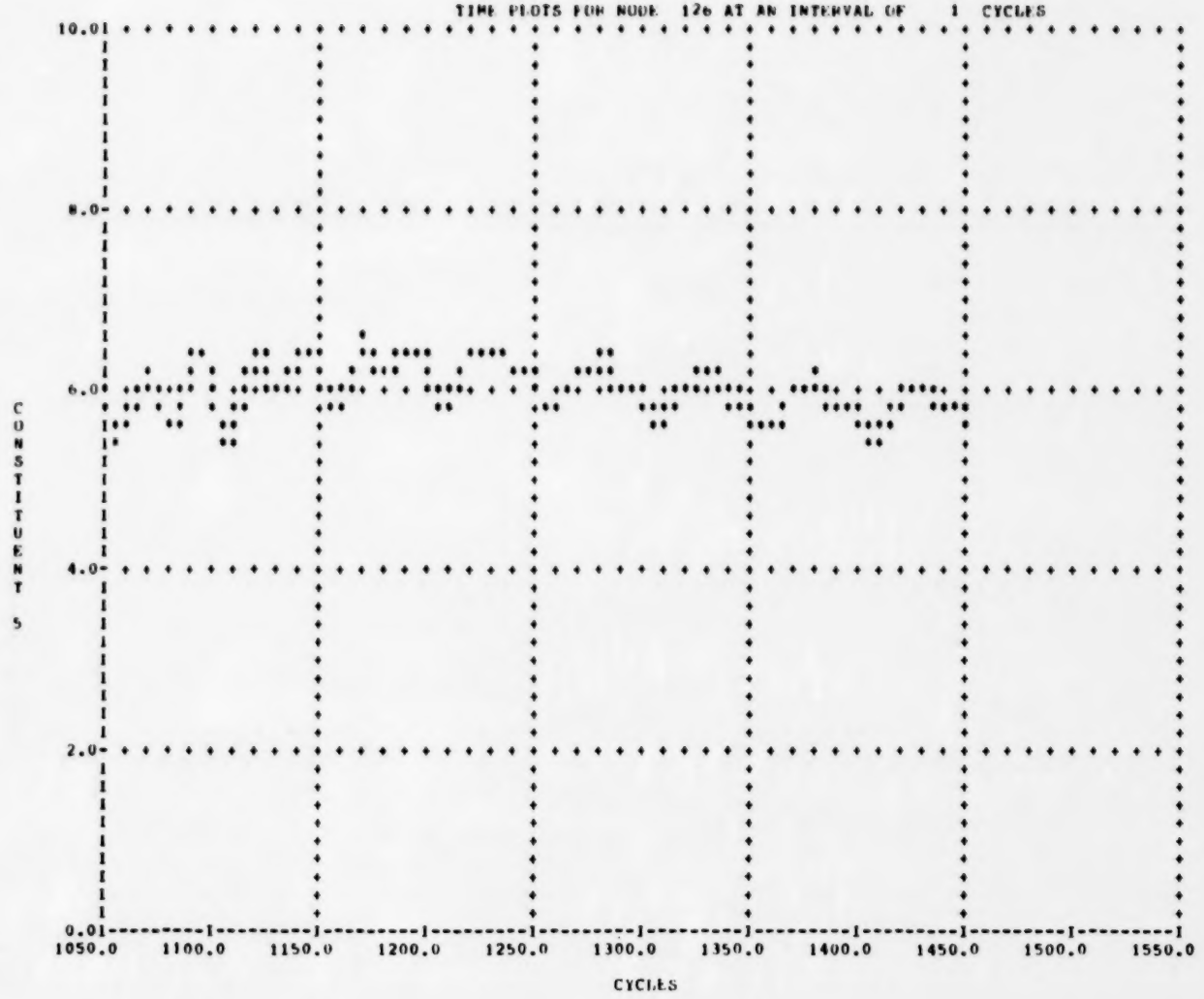
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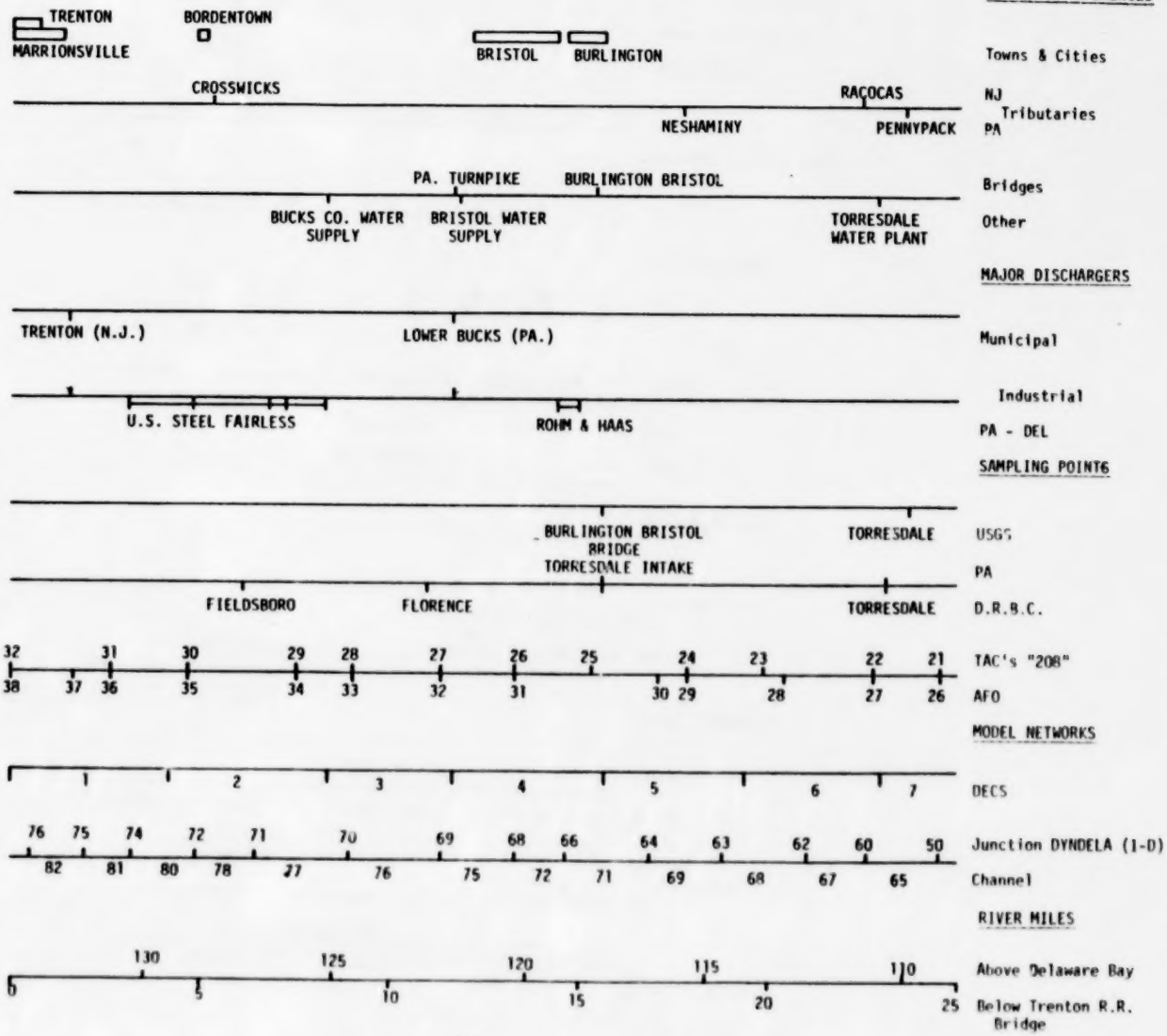
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TORRESDALE
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TAC's "208"
AFO
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DECS
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82 81 80 78 77 76 75 72 71 69 68 67 65
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Channel
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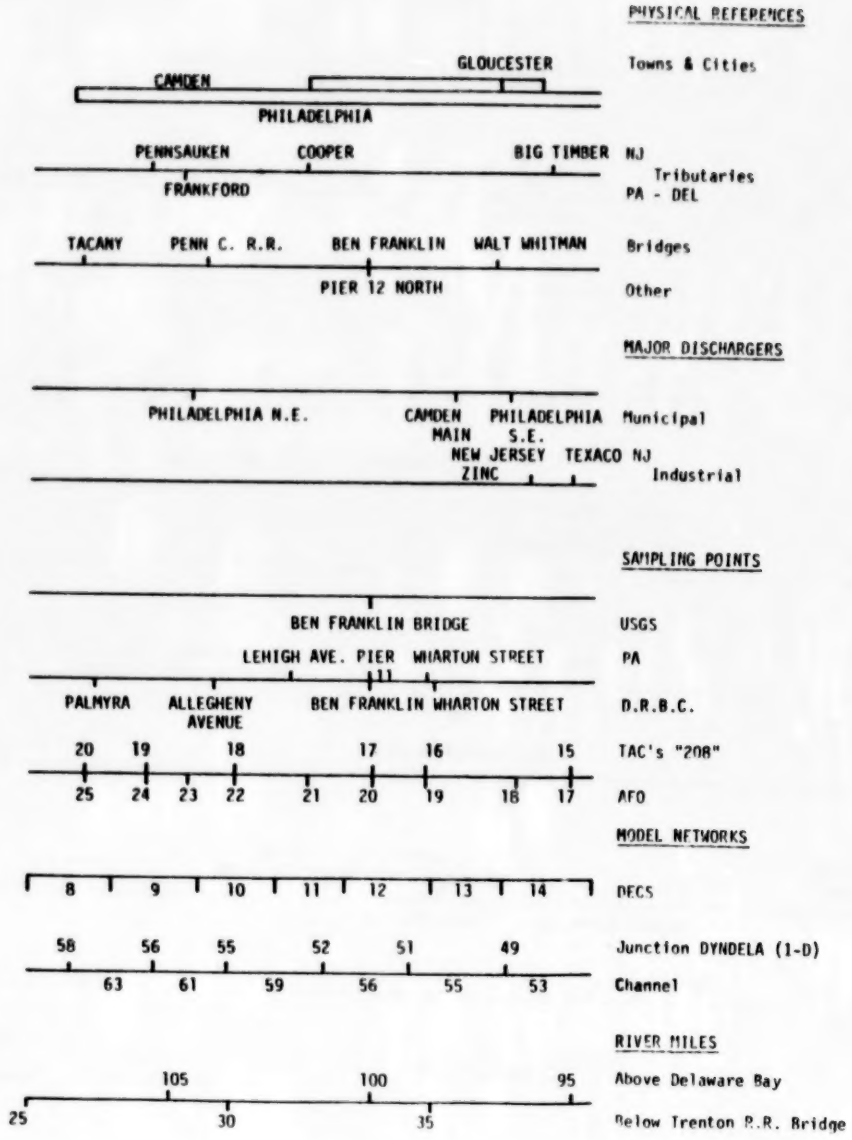
Below Trenton R.R. Bridge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Bridges
PIER 12 NORTH
Other
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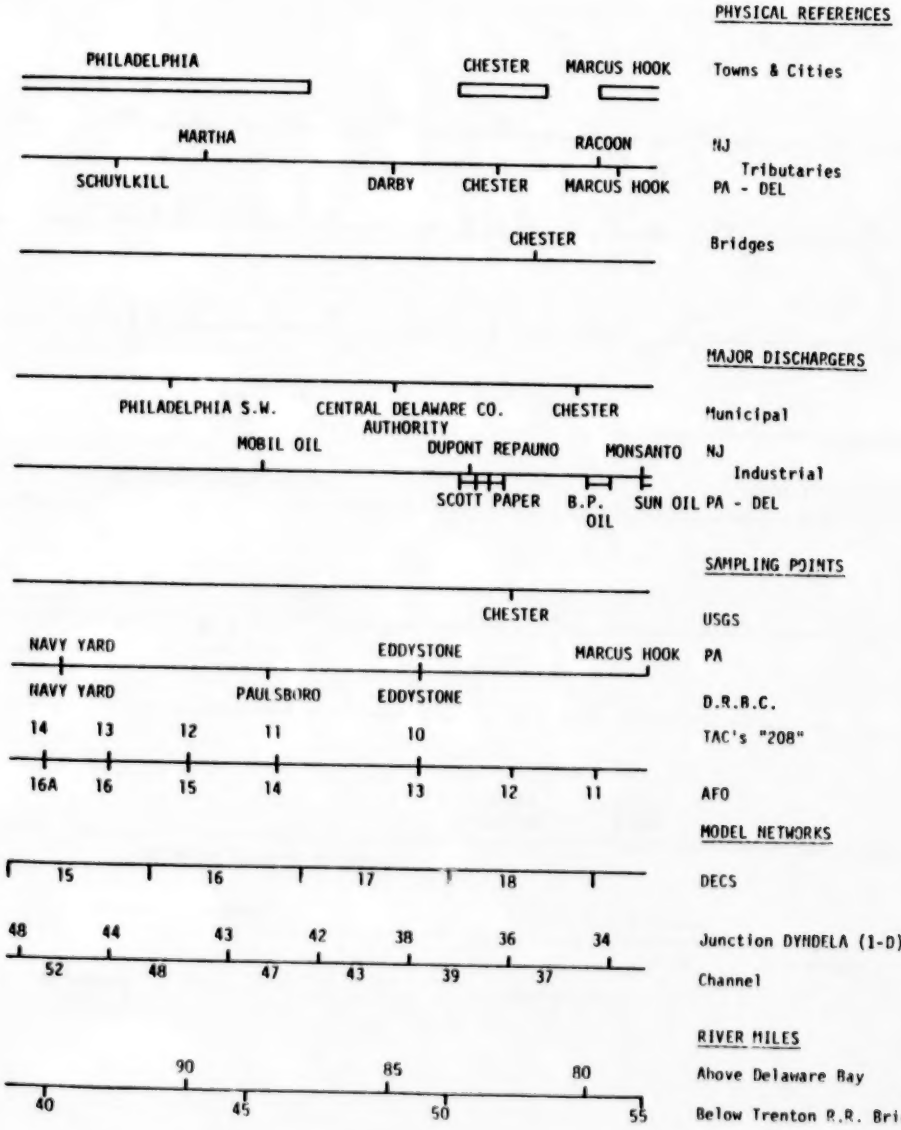
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DARBY
CHESTER
MARCUS HOOK
PA - DEL
CHESTER
Bridges
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PHILADELPHIA S.W.
CENTRAL DELAWARE CO. AUTHORITY
CHESTER
Municipal
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MONSANTO
NJ
Industrial
SCOTT PAPER
B.P. OIL
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PA - DEL
SAMPLING POINTS
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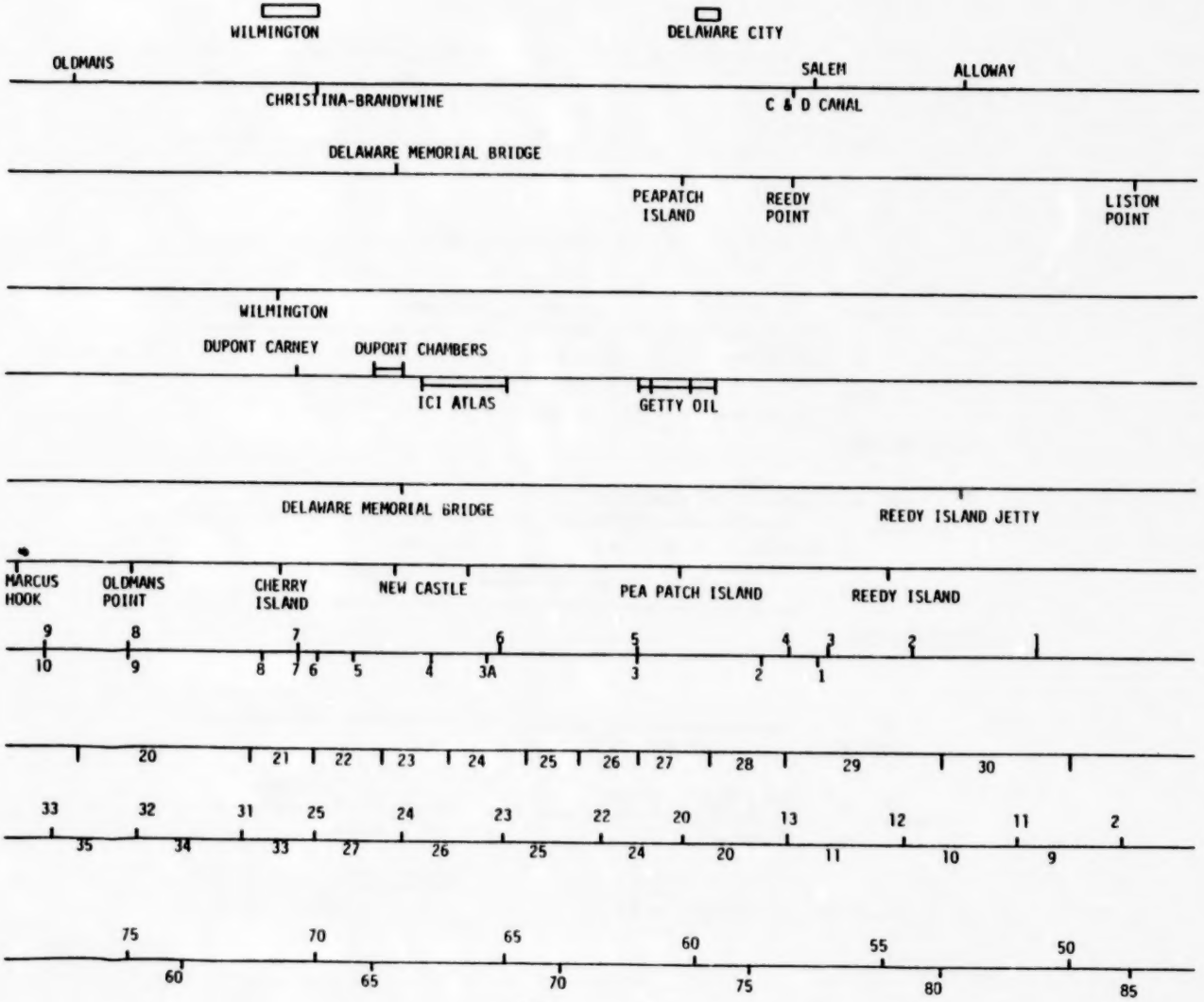

PHYSICAL REFERENCES

Towns & Cities

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Bridges

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SAMPLING POINTS

USGS

D.R.B.C.

TAC's "208"

AFO

MODEL NETWORKS

DECS

Junction DYNDELA (1-D)

Channel

RIVER MILES

Above Delaware Bay

Below Trenton R.R. Bridge

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16. ABSTRACT

The Annapolis Field Office (AFO) of the Environmental Protection Agency has been actively engaged in the mathematical modeling of the Delaware Estuary since 1973. During the past several years, the Delaware water quality model has undergone considerable revision and expansion. This report is the second in a series of reports documenting the Delaware modeling efforts at AFO. While the model presented in this report has been adapted to the Delaware Estuary, it is by no means unique to that body of water.

This report discusses the basic principles and theories underlying the Dynamic Delaware Estuary Model. A description of the water quality interactions modeled in the Delaware are also presented. Being a User's Manual, this report also contains listings of the hydraulic and water quality models, a detailed description of each program and its logical structure, variable definitions, data deck sequences, and sample input/output.

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a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Estuaries Algae Simulation D.O. Budget Mathematical models User's Manual	Delaware Estuary Estuarine Modeling Water Quality Simulation Non-linear Mathematical Model	

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